International Conference
The Future of Education
**Virtual Edition**
18 - 19 June 2020

# Conference Proceedings

**Edited by Pixel**

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# CONFERENCE PROCEEDINGS

# 10th International Conference The Future of Education

# *Virtual Edition*

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# INDEX

# Adult Education

# Changing Occupational Status of Vet Teachers and Trainers: The Case of Lithuania

## Ausra Rutkiene[1], Genute Gedviliene[2], Vidmantas Tutlys[3]
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## Abstract

*Nowadays changes in educational system also have reflection in vocational training system. Their roles, occupation status also was changed. Survey was conducted in Lithuanian VET schools. Research sample consisted of 324 respondents from 10 public vocational education and training centres from the different regions of Lithuania. Half of the teachers see their expression possibilities by work in the professional and personal field as quite positive; more than 90% evaluate them more positively than negatively. Small amount of respondents' state that their work very little allows or doesn't allow to express themselves. So, it means that most of VET teachers their work also sees as self-expression possibility. 223 (68,8%) respondents willing to stay in the VET system. The main reasons to stay are good opportunities for learning and improvement and interesting and meaningful work. Some of teachers stress internal aspects to stay teacher in VET sector (self-expression) but much more teachers stressed external aspects such as carrier possibilities, image of VET in society. Application of professional or pedagogical development strategies is influenced by differences in VET centres, especially participation in seminars organized by suppliers/producers of materials and equipment and self-learning through the Internet, distance learning opportunities. Data collected during Erasmus+ project TEACHVET (2018-1-LT01-KA202-047053) activities.*

*Keywords: Vocational training, VET teachers, VET trainers*

## 1. Introduction

After 1990s Lithuanian educational system experienced crucial changes. And it was several times. Vocational training system experienced changes in its structures as well as in its popularity and prestige in society.

Demographic situation in Lithuania has changed after 1990s: number of inhabitants in Lithuania decrease. Changes in society, ICT development, establishment of European Union also influence changes in education. Students are changing and new competences require from teachers in schools and universities. At the same time teachers in all levels of education need new competencies. All mention aspects determine changes in VET teachers' occupation. The aim of the study – to present changes in VET teachers' and trainers' occupation status in Lithuania.

## 2. Changes of VET System in Lithuania

VET system experienced changes in political, economic, evet paradigm aspects. It was a part of systematic changes in education in Lithuania. Until 1994 the employment of VET teachers was not regulated. It was required just to be good specialist in a field.

As CEDEFOP states, technological changes drive the need to update VET teacher

competences [3]. No special preparation for VET teachers has been in Lituania.

Teachers and trainers for VET were educated as professionals with pedagogical qualification (pedagogical qualification or must have participated in a basic course on pedagogy and psychology). Concept for VET teacher education and training in Lithuania in 2001, later Law on Vocational Education and Training of the Republic of Lithuania [4] aimed to change the training system for VET teachers as regards planning, implementation and evaluation. Minister of Education and Science degree in 2005 regarding the qualification requirements for teachers in preschool, primary, general, secondary, special and vocational education programmes define the main regulations and requirements for VET teacher education and qualification [6]. New programmes for VET teacher training in companies have been implemented in cooperation with employers since 2013; teachers can update their qualifications during traineeships in modern companies. Some special VET teacher training attraction initiatives were organized, including attracting highly-skilled and experienced employees to work as VET teachers.

Numbers of teachers and trainers in VET sector decreased in last decade. There are two types of teachers in VET institutions: general education subject teachers and vocational teachers. Vocational teachers represent about 50-60 percent of all teaching personnel in 2019. In 2015 part of vocational teachers was about 70 percent.

Several years ago, a national level project '*Development of the system for the development tof vocational and adult teachers*' qualifications' was launched. 764 vocational teachers and VET institutions' managers attended training courses on such topics as empowerment of sectoral practical training centres, evaluation of learning outcomes, VET didactics, application of research in VET practice and other topics [6].

They developed their competencies on creativity, ICT use, VET for students with special educational needs, teaching methodologies.

From 2002, VET curricula in Lithuania have been competence-based, with clearly-defined learning outcomes [5]. Now the activities of VET teachers and trainers and their competence development in Lithuania are legally regulated in a centralized way with significant role played by the key national laws and legal acts and the functions of regulation in this field delegated to the Governmental institutions [7]. Next to perfect knowledge and abilities in VET specialization field, nowadays the competence profile stronger focus on the field of management and organisation of the education and training processes. Last 4-year VET system has experienced fast implementation of the modular competence-based curricula in the VET system. This also leads to a re-focusing of the functions and competences of VET teachers from the didactics of the subject-based training that prioritise provision and practical application of vocational knowledge and basic skills to the approaches of integrated training in the real work processes. This requires to pay more attention to the different organisational aspects of training and learning [7].

Complexity of VET teachers' competencies and activities lead not very high presage of VET teachers in society. A good image of VET services would lead to more gifted young people choosing vocational training, such young people would graduate with better results and could be more easily employed by companies [2]. Urneziene and Tolstych [8] revealed that the initial VET providers often lack clear strategies on how to use the measures of dissemination related to public relations and management of an educational institution. It might become the reason to leave VET teachers or trainers position, not to seek career in VET sector.

## 3. Empirical Findings on Changing Occupational Status of VET Teachers and Trainers

Research sample consisted of 324 respondents from 10 public vocational education and training centres from the different regions of Lithuania representing both bigger cities (*2 VET centres*), regional centres (*2 VET centres*) and rural areas (*6 VET centres*).

Different data collection methods (paper and pencil questionnaires versus online responding) probably also contributed to the variability of answers. Questionnaire consisted of 65 items including some optional open-ended questions. Most variables of the research are ordinal with four or five response categories. Nominal (mostly dichotomous) variables were also used. There are no continuous variables. Frequency tables, bar and pie charts were used for descriptive statistics. Statistical analysis was performed with IBM SPSS Statistics, version 25. Structural equation modelling was performed with Mplus program versions 8.2 and 8.3.

### 3.1 VET Teachers' Personal Data

Most of respondents (73,7%) are at least 41 years old. Data demonstrates tendencies in Lithuania that most of teachers at VET sector are not young. 35,1% of teachers are older than 50 years (Fig. 1).
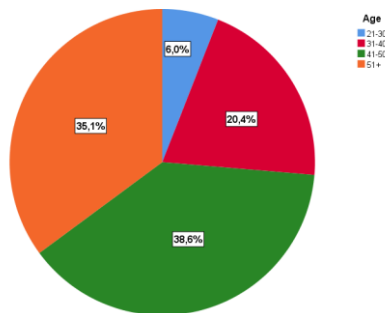


*Fig. 1. Distribution by respondents' age*

Duration of service as a vocational training teacher or trainer is at least 11 years for most (60,5%) of the respondents (Fig. 2). Quarter of respondents have experience from 5 to 10 years.
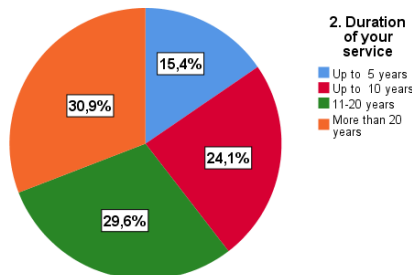


*Fig. 2. Distribution by respondents' duration of service as a vocational training teacher or trainer in the company*

All the survey participants have professional or vocational qualification and only 5 (1,5%) have reported not to have pedagogical qualification. Professional qualifications are very different, e.g., hairdresser, manager, mechanics engineer, bookkeeper,

musician, sports trainer, etc.

258 teachers (81,9%) answered that their job of a vocational training teacher is their permanent job. There are 57 (18,1%) who answered "No". 9 teachers didn't answer. For most of them job of the VET teacher (trainer) is the only job. However, quite a large proportion (38%) of teachers have other jobs, in some cases even as main jobs (Fig. 3).
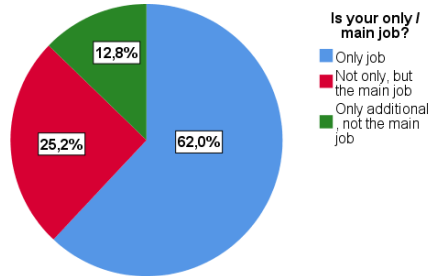


*Fig. 3. Distribution by respondents' job status as the only / main / only additional*

### 3.2 Self-expression and Career Opportunities

Half of the teachers see their expression possibilities by work in the professional and personal field as quite positive; more than 90% evaluate them more positively than negatively. Small amount of respondent's state that their work very little allows or doesn't allow to express themselves. So, it means that most of VET teachers their work also sees as self-expression possibility.
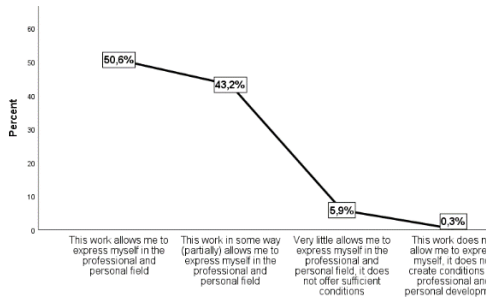


*Fig. 4. Expression possibilities in the professional and personal field*
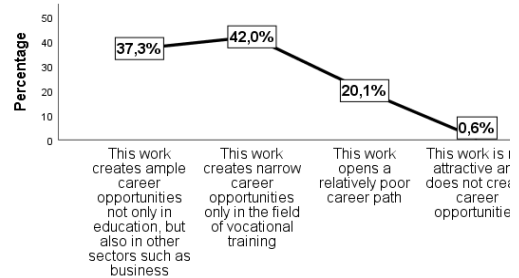


*Fig. 5. Career opportunities*

Slightly more pessimistic are opinions of respondents about their career opportunities. 20,7% of them view these opportunities as relatively poor if not worse (Fig. 5).

Opinions of respondents about their future plans as vocational training teachers or trainers are very important: do they plan to continue working in VET or do they think to leave? Only 16 (5,0%) said that they think to give up the present career, 223 (69,0%) said "No", and 84 (26,0%) were undecided. One respondent didn't answer.

Of those 16 who think to give up, the most often mentioned reason is "unsatisfied with salary", as shown in Fig. 6. "School principals play an important role in ensuring that teachers undertake CPD: in most countries, they decide whether a teacher can or should undertake CPD" [1]. Salaries of VET teachers depend not only form principal but also from the state regulation. But they could impact teachers about their CPD and future career.
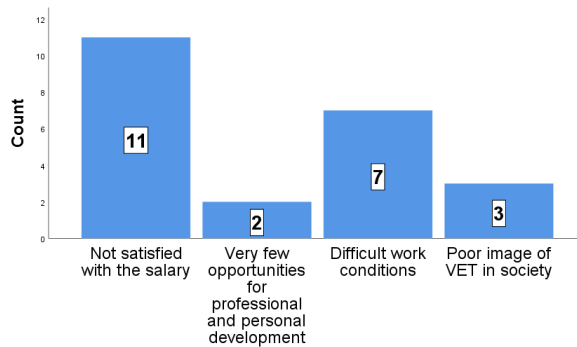
*Fig. 6. Reasons to give up a career as a vocational training teacher*

Among those 223 who don't think to give up, the main reasons to stay are good opportunities for learning and improvement and interesting and meaningful work (Fig. 7).

Image of VET in society is relatively unimportant both for those who want to quit and those who want to stay.
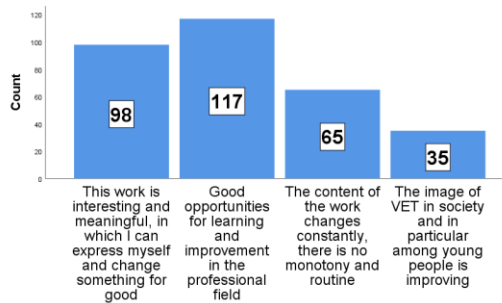


*Fig. 7. Reasons of not to give up a career as a vocational training teacher*

Some of teachers stress internal aspects to stay teacher in VET sector (self-expression) but much more teachers stressed external aspects such as carrier possibilities, image of VET in society.

## 4. Conclusions

Half of the teachers see their expression possibilities by work in the professional and personal field as quite positive; more than 90% evaluate them more positively than negatively. Small amount of respondents' state that their work very little allows or doesn't allow to express themselves. So, it means that most of VET teachers their work also sees as self-expression possibility. 223 (68,8%) respondents willing to stay in the VET system. The main reasons to stay are good opportunities for learning and improvement and interesting and meaningful work. Some of teachers stress internal aspects to stay teacher in VET sector (self-expression) but much more teachers stressed external aspects such as carrier possibilities, image of VET in society. Application of professional or pedagogical development strategies is influenced by differences in VET centres, especially participation in seminars organized by suppliers/producers of materials and equipment and self-learning through the Internet, distance learning opportunities.

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# Restorative Learning: A Theory, an Application, and a Powerful Effect

## Christine Johnston[1], Gabriella Klein[2]

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### Abstract

*Many adult learners' early school experiences leave them with learning insecurities that inhibit them from taking advantage of workforce and other educational training opportunities. This paper documents the inception, refinement and application of a theory of restorative learning that re-establishes an individual's self-efficacy and motivation to strive to learn. The Interactive Learning Model (1994), a metacognitive based theory of restorative learning, addresses how individuals process the world and self-regulate to become successful learners. Its first years of testing (1994-2010), found the theory viable and its process-driven implementation, (the Let Me Learn Process®) equally effective in helping adults understand themselves as learners and leverage their new empowerment to achieve sustainable career goals. From 1994 to the present the research on this form of restorative learning has operated as a continuous chain of studies spanning the EU, US, Australia, and India documenting its use with over 100,000 previously under-served adults. This paper presents the effects of bringing restorative learning into adult learners' educational, work, and life contexts through the use of a web-based app. Participants in this session will experience how this model of restorative learning contributes to transformational change in adult learners and increases their ability to adapt to new cultural, social, training, and workplace learning environments.*

*Keywords: restorative learning, metacognition, transformational change*

### Introduction

Learning begins with our first breath. By the time we enter formal schooling, we are experienced learners. We are not, however, experienced students. The result of the disconnect between an individual's way of learning and the teacher's expectations, leaves the learner with a damaged sense of self which is carried into adulthood and inhibits his/her willingness to return to formal schooling or professional training for fear that once again he/she will experience the same diminution of their personhood as experienced during their earlier years of schooling.

This paper reports how individuals using the Interactive Learning Theory (ILT) can regain their lost sense of value as learners. It traces a 25-year history of restorative learning, including the development of an instrument (Learning Connection Inventory, (LCI)), and describes the process whereby individuals restore their loss of identity as learners. Finally, it relates a series of applications in which this process has been successfully used to empower learners to persist in achieving greater success in the classroom and beyond.

**A Theory of Restorative Learning**

The ILT focuses on a learner's patterned mental processes. It posits that a learner's patterned learning processes "talk" within the learner's mind (driven by metacognition) as one completes learning tasks. Each patterned mental process is made up of three strands: The cognitive strand of mental acuity, memory, range of experiences, and ability to work with abstractions or concreteness; the conative strand of learned skill, pace, autonomy, use of personal "tools" and degree of engaged energy; and the affective strand of feelings, values, and sense of self. The strands communicate with each other mulling over the task, connecting with prior tasks, attending to the task in a timely manner, rehearsing the performance of the task, and ultimately completing the processing of the task.

*Fig. 1. A Summary of Interactive Learning Processes adapted from* A Guide to Implementing the Let Me Learn Process *(Johnston, 2001); Taking Charge (2014). [2]*

|  | How I think | How I do things | How I feel | What I might say |
|---|---|---|---|---|
| Sequential Process | ▪ I organize information<br>▪ I analyse data<br>▪ I break tasks down into steps | ▪ I make lists<br>▪ I organize<br>▪ I plan first, *then* act | ▪ I thrive on consistency and dependability<br>▪ I need things to be tidy | ▪ Could I see an example?<br>▪ I double-check my work<br>▪ Could we review those directions? |
| Precise Process | ▪ I research information.<br>▪ I ask *lots* of questions.<br>▪ I want to know | ▪ I challenge statements<br>▪ I doubt<br>▪ I prove I am right | ▪ I thrive on knowledge<br>▪ I feel good when I am correct | ▪ I need more information<br>▪ Let me look up the answer<br>▪ Did you know? |
| Technical Reasoning Process | ▪ I seek relevance.<br>▪ Keep it brief<br>▪ I only want as much information as I need | ▪ I get my hands on<br>▪ I tinker<br>▪ I solve problems | ▪ I enjoy knowing how things work<br>▪ I need concreteness<br>▪ I don't share my knowledge | ▪ I can do it myself<br>▪ Let me show you<br>▪ How will I ever use this in the real world? |
| Confluent Process | ▪ I read between the lines<br>▪ I think outside the box<br>▪ I brainstorm | ▪ I take risks<br>▪ I am not afraid to fail<br>▪ I talk about things – a lot | ▪ I enjoy energy<br>▪ I feel comfortable with failure<br>▪ I embrace new ideas | ▪ I say no to lock step tradition.<br>▪ The rules don't apply to me<br>▪ I have an idea |

Those conducting ITL studies with adult learners found that individuals can learn to explain in real time the mental activities occurring within them as they complete learning tasks providing a window on the mind that allows teachers, peers, and mentors to form a supportive relationship whereby they can guide an individual's learning to a successful completion. Case studies of these individuals documented a renewed positive sense of self as a learner as a result of using this approach.

**An Instrument**

The Learning Connections Inventory (LCI), the instrument used to capture each individual's interactive learning processes, was initially tested with 9,000 adults in the US, UK, IT, CNA, and MT [1]. Additional studies over a four-year period tested the instrument with 5000 secondary students in the US, Australia, and Great Britain. Seven tests of validity and reliability were conducted on the LCI instrument [3].

**An Application**

Whether working with early leavers, adults seeking diploma completion, displaced workers, the unemployed or under-employed, military veterans, or those seeking a new career path, the method for implementing the process begins with completing the Learning Connections Inventory (LCI). Originally conducted using paper and pencil instruments, the LCI is now embedded within a web-based technology, "The Personal Learning Coach (PLC)."

Using the PLC, individuals complete the LCI, receive validated results, and begin their journey towards restorative learning. This includes receiving information about their specific combination of learning processes, a comparison between their learning processes and the learning task, and specific strategies to help the learner adapt his/her learning processes to the task. These strategies allow adult learners to work autonomously to complete math, reading, writing, study, and work tasks at home, at work, or in a classroom. The PLC also guides individuals on how to match their learning processes to potential career paths.

**A Powerful Effect**

The restorative learning approach has been used as an intervention with displaced workers under the auspices of an EU Grundtvig Project with work sites in Slovenia, Italy, England, Netherlands, Czech Republic, and Malta [4].

It has also been tested with employees in a toy manufacturing plant in Malta and with a Fortune 500 international chemical corporation manufacturing plant designated to close.

In the latter case, the plant's personnel were required to learn lab protocols, institute highly precise quality control processes, and revise documentations methods that had lagged behind corporate standards. 75% of the individuals in the pilot self-identified themselves as non-learners or training resistant prior to the implementation of the pilot.

Within two years of using the ILT restorative process, the chemical plant's operations stabilized and it was re-designated as a financially productive plant [5].

The use of the LCI within the restorative learning process has played a central role within four EU co-funded projects (SPICES, e-SPICES, BRIDGE-IT, and RADAR) each focused on adults-in-mobility, i.e., migrants and adults-in-contact-with-mobility. Data from each project indicate that the use of the LCI assisted instructors and participants in gaining enhanced intercultural communication. [6]).

*Fig. 2. From SPICES Guidelines, p. 168 (Klein 2007; cf. also Klein 2016)*

**ACTIVITY 4**

| Categories | Description |
|---|---|
| General or specific training objective | • The participants learn to distinguish different types of formal greetings within culturally different ways of introducing oneself.<br>• Introduce paraverbal characteristics. |
| Procedures | Identify different types of body language that can be observed |
| Training methods | Plenary work |
| Time input | 45-60 minutes |
| Notes – instructor awareness: | Discussion about how one greets in the context country and in the participants' country of origin; the different types of greetings within different situations and/or different contexts are considered; cultural differences in interactions in the country of context and in the participants' country of origin; audio/video-recordings from the media may be put together by the trainer.<br>The trainer needs to make sure to involve everyone. Those who lead with technical reasoning might find it difficult to participate in discussions and they might give the impression that they are not interested. On the contrary those with high score in confluence if not directed well might derail the discussion. Those who have three or all four patterns in the use first level might need a firm discussion leader not to take over the discussion. |

Apart from using the LCI with participants, the project leaders used the LML restorative process to construct the train-the-trainers' Guidelines. For each learning activity instructions were developed on how to deal with the task. A 2020 project [7] applied for will incorporate the use of the PLC and thereby add ways in which project participants can expand their access to the LML restorative learning opportunities.

**Conclusion**

Learning lies at the heart of our sense of self as individuals. As a result, early school experiences that result in feeling misunderstood and under-valued, remain with us into adulthood. The Interactive Learning Theory (ILT), the LCI, and the LML Process® were developed twenty-five years ago to address this need [8]. Now embedded within the web-based app, these continue to function as a tool that launches the restorative learning process. As a result of this person-specific process, individuals learn to self-regulate their feelings and learning behaviours. The future for restorative learning is in its infancy. Looking forward we should consider using data accumulated through the PLC to increase our understanding of the mental processes used in learning and thereby have a more complete basis for understanding and identifying the potential of all learners.

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# The Adult Cultural Awareness Competencies Development through the Theatre Art

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## Abstract

*The article seeks to reveal the attitudes of adults towards cultural awareness through the art of theatre. Theatre arts are a unique way to cultivate cultural awareness, revealing the harmony of the world around us and understanding the environment in all senses. A quantitative survey of adults conducted in Lithuania showed that people's attention to culture and cultural awareness is increasing. The results confirmed, that cultural awareness is important pursuits of adult cultural. The majority of the respondents assess these pursuits as important is statistically significantly related to theatre art: watching performances in theatre or recreation centres.*

*Keywords: adults, culture, competence, cultural awareness, pursuits*

## Introduction

Cultural awareness is person's competence which manifests itself by the ability preserve cultural diversity and participates in socially valuable cultural expression activities.

*Research aim* is to reveal adults' attitude to cultural awareness through theatre arts.

*Research methods.* Theoretical and empirical analysis methods: scientific literature analysis and quantitative research. Questionnaire survey method was applied using semi-structured questionnaire.

Statistical data analysis methods were used aiming at processing the obtained empirical research data. Questionnaire data were statistically processed using program software's IBM SPSS Statistics. Performing the quantitative research, descriptive and multivariate statistic methods were applied: cluster, correlation and structural modelling of equations.

## Theoretical Framework

Adult participation in cultural life, which undoubtedly develops awareness, general literacy, and improves knowledge and competencies (P. Freire, 1994). The adult participates independently in the process of cultural education. The role of culture in the development of a holistic personality is widely emphasized in the work of many classical philosophers and educators (Clayton *et al.*, 2008; Byram, 2004; Forrest, 2003; Taylot, 2003). Adult participation in cultural activities stems from the need to act, as experience is the basis of his or her learning. In other words, artistic activity usually responds to a person's social, cultural-social needs.

From the very beginning of human culture, theatre, as part of art, has been an essential element of the intellectual, emotional, and spiritual state in cultural life (Kim, 2005; Landy, 2007). Thus, it can be assumed that art, specifically theatre, is an

instrument of cultural awareness of adult viewers (Chodzkienė, 2012; Melnikova, 2007).

If participation at the theatre performance is considered to be education of adult-spectator's awareness, it is worth remembering G. Foley's (2007) approach to adult education where he discusses learning from four different perspectives. First, learning as acquisition, where competence, understanding, awareness, wisdom, and etc. are acquired by a person through his/her learning experience. Second, learning as reflection, where learners actively construct their knowledge which creates new meanings and realities.

Third, learning as participation, where attention is devoted to human's ability to meaningfully participate in everyday work of a concrete community. Fourth, learning which emerges during common physical process, which challenges the current person understands and is expressed as a change process, emerging from relations between people and everything that participates in a concrete situation: people, special layout, movement, tools and things (Foley, 2007, p. 69).

These four perspectives are merged into one universal definition of learning which speaks about learning as a change process that brings adult person's attitudes into question, develops his/her professional competences, and allows acquisition of new knowledge.

## Methodology

The aim of the research is to reveal the attitude of adults to the art of theatre through cultural awareness.

*Research methods:* Theoretical analysis. The type of quantitative study used. A questionnaire survey was conducted. The research questionnaire consists of 11 blocks of questions and 5 additional questions.

The article uses only the part of the questionnaire that is dedicated to finding out about theatre art and cultural literacy. Statistical data analysis methods are used to process the obtained data.

*Survey participants*: 593 adult respondents of various ages. The age span was from 18 to 59 ages.

## Research Findings

The majority of the respondents assess these pursuits as important: reading books in leisure time (76.3 perc.), watching performances at the theatre (70.0 perc.), reading newspapers and magazines in leisure time (67.5 perc.), watching movies at the cinema (59.4 perc.), watching performances in recreation centers (58.5 perc.), watching movies on TV (56.8 perc.), attending pop music concerts or listening to pop music in other ways (55.55 perc.), visiting museums (50.7 perc.), and attending art exhibitions (50.2 perc.).

| Pursuits | Very important | | Important | | Not very important | | Unimportant at all | |
|---|---|---|---|---|---|---|---|---|
| | N | perc. | N | perc. | N | perc. | N | perc. |
| Reading books in leisure time | 204 | 35.3 | 237 | 41.0 | 109 | 18.9 | 28 | 4.8 |
| Reading newspapers and magazines in leisure time | 146 | 25.3 | 244 | 42.2 | 151 | 26.1 | 37 | 6.4 |
| Visiting art exhibitions | 81 | 14.4 | 201 | 35.8 | 209 | 37.3 | 70 | 12.3 |
| Visiting museums | 81 | 14.4 | 205 | 36.3 | 217 | 38.5 | 61 | 10.8 |
| Attending classical music concerts or listening to classical music in other ways | 64 | 11.7 | 179 | 32.7 | 222 | 40.5 | 83 | 15.1 |
| Attending pop music concerts or listening to pop music in other ways | 74 | 13.1 | 240 | 42.4 | 198 | 35.0 | 54 | 9.5 |
| Attending folk music concerts or listening to folk music in other ways | 55 | 10.0 | 156 | 28.5 | 236 | 43.1 | 101 | 18.4 |
| Attending performances at the theatre | 123 | 21.7 | 274 | 48.3 | 133 | 23.5 | 37 | 6.5 |
| Attending performances in recreation centers | 86 | 15.5 | 239 | 43.0 | 175 | 31.5 | 56 | 10.1 |
| Watching performances on TV | 53 | 9.7 | 156 | 28.7 | 252 | 46.3 | 83 | 15.3 |
| Watching movies at the cinema | 96 | 17.1 | 237 | 42.3 | 184 | 32.9 | 43 | 7.7 |
| Watching movies on TV | 110 | 19.4 | 269 | 47.4 | 156 | 27.5 | 32 | 5.6 |

Correlation coefficients and factor analysis performed show that the respondents can be characterized as having a general (often positive) attitude to art and the related leisure pursuits which foster their reading pursuit, attending art events, watching movies, and etc. Kendall b=0.82***. Those who admit that attending art exhibitions is important also consider attending classic music concerts or listening to classic music in other ways to be an important leisure pursuit (67.3 perc. b=0.56***). It was interesting to find out how watching performances is related to other leisure pursuits. Correlations show that those who assess watching performances at the theatre as important, most often find watching performances in recreation centers important as well (78.6 perc. b=0.66***); however, the correlation with the leisure pursuit watching performances on TV is considerably weaker: b=0.29***. It appears that people attend performances not only to satisfy their artistic needs but for other reasons as well, for instance, need to communicate with others.
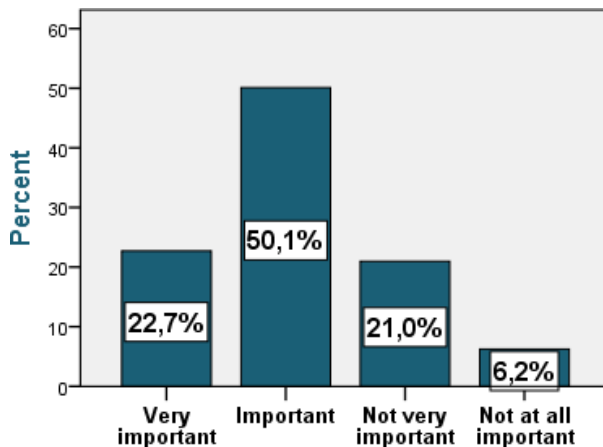


*Fig. 1. Respondents' opinion on the importance of attending performances at the theatre or recreation centre*

As such leisure pursuits as watching performances at the theatre and at recreation centers are closely interrelated, therefore even 73% of the respondents consider watching performances to be important. Kendall b correlations coefficients indicate that the importance of the pursuit watching performances at the theatre or recreation center is first of all related to the following leisure pursuits: attending art exhibitions (b=0.49***), visiting museums (b=0.49***), attending classical music concerts or listening to classical music in other ways (b=0.46***). The second group consists of such leisure pursuits as reading books in leisure time (b=0.40***), attending pop music concerts or listening to pop music in other ways (b=0.38***), attending folk music concerts or listening to folk music in other ways (b=0.37***), watching movies at the cinema (b=0.36***), watching performances on TV (b=0.32***), and reading newspapers and magazines in leisure time (b=0.28***). The importance of the pursuit watching performances at the theatre or recreation center is related to the importance of the pursuit watching movies on TV; this relationship is considerably weak but statistically significant: b=0.19***.

*Table 2. Relationship between importance of cultural awareness and reasons for attending a theatrical performance applying Kendall tau-c coefficient*

| Reason of attendance | c | p |
|---|---|---|
| I like theatre art | 0.20 | <0.001 |
| It fosters my creative self-expression | 0.19 | <0.001 |
| It enhances my thoughts and feelings leading to acquiring better knowledge about the surroundings | 0.17 | <0.001 |
| It is my leisure time pursuit | 0.12 | 0.005 |
| I cannot refuse invitations from other people to attend a performance | 0.09 | 0.004 |
| I perceive theatre art | 0.09 | 0.011 |
| It is an opportunity for me to learn about my strengths and weaknesses | 0.08 | 0.022 |

It was analysed how attending a theatrical performance, reasons that enhance people to attend a theatrical performance as well as reasons for not attending a theatrical performance are related with the respondents' gender, age, educational background and place of residence. No distinct gender differences were found (p<0.01); with the increase in age, there is increase in attending a theatrical performance more often (b=0.14***), respondents admit more often that they like theatrical art (b=0.18***), that it is a form of communication (b=0.18***) and a leisure time pursuit (b=0.11**). On the other hand, with the increase in age, the percentage of respondents who state that performances do not interest them (b=-0.14***) and that theatrical performances are not brought to the respondent places of residence (b=-0.11**) declined. Educational background is more clearly related to the frequency of attending a theatrical performance (b=0.23***) as well as to some other reasons for attending: people like theatre art (b=0.24***), consider it to be a leisure time pursuit (b=0.19**), a form of communication (b=0.19***), performance enhances their thoughts and feelings leading to acquiring better knowledge about the surroundings (b=0.15***), they understand theatre art (b=0.14***). The type of place of residence is related at 0.01 level of statistical significance only to the understandable reasons for not attending a theatrical performance: lack of theatres nearby (b=0.20***) and lack of theatrical performances brought to the respondent's location (b=0.11**).

Summarizing the research data, it was observed that the respondents with higher education and older age are more likely to visit the theatre.

**Conclusions**

The disclosure of adults' attitudes towards cultural awareness and education in theatre art revealed:

- In all cases, cultural awareness pursuits are positively correlated with each other. From this it can be concluded that all the pursuits in question are more or less related to cultural awareness in such a way that pursuits and cultural awareness are strengthened without contradiction with each other.
- The generalized factor of the respondents' abilities shows that with the increase of age and the decrease of the population in the respondent's place of residence, the assessment of cultural awareness abilities slightly deteriorates. The assessment of cultural awareness abilities is positively correlated with the assessment of the importance of cultural awareness and is positively correlated with the frequency of theatre attendance.

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# The Importance of Using Technology in Education

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## Abstract

*Technology is developing faster than ever before, and since the increasing development of remarkable innovations, digital technologies have changed our lives in the perspective that humankind dreamed in the past. The educational sphere has also been affected by these changes. These disrupting technologies are undoubtedly changing the educational system as well. It is now more straightforward and more accessible for educators to impart their classes in which students can effectively acquire the necessary knowledge to prepare them for life. A variety of software, tools, and applications have increased the availability of information, the general interest in a range of topics, and the interaction between students and teachers. It also affected not only the learning capability of students but also the public enlightenment as well as. The long path from manual control to automatization and the new technological era brings many more opportunities for trainers and listeners. The present article deals with an overview impact and influence of technology on education. It discusses technologies that we are already familiar with, e.g., videoconferencing, screen recording programs, class organizer applications, cloud technology; and also, more recent advancements, such as speech recognition tools, virtual reality (VR) and augmented reality (AR) and artificial intelligence (AI).*

*Keywords: artificial intelligence, education, information, communication, technology*

The development of e-learning is related to the improvement of ICT. Some of the existing technologies are an addition to traditional education, while others can substitute entirely (Kiryakova, G., 2009). Considering the recent outbreak of Coronavirus, distance education has mandatorily been implemented in different educational levels worldwide.

Although the technology was already available, these unexpected circumstances require educators to implement these technologies more frequently than ever (Dudin M.N., Shakhov O.F., Shakhova M.S., Rusakova E.P., Sizova Y.S. (2019).

On the one hand, distance learning is defined as improved capabilities in knowledge and/or behaviours as a result of mediated experiences that are constrained by time and/or distance such that the learner does not share the same situation with what is being learned. On the other hand, distance education is considered a formalized instructional learning by not affording in-person contact between student and instructor (Drivere-Richmond, K., King, F. B., Schrader, P. G. & Young, M. F., 2001).

Distance education and e-learning are developing and adaptive multidisciplinary fields. The different generations of distance education and e-learning have been affected by the technology's dominant at their respective times. Therefore, it is possible to say that information and communication technologies are an intrinsic part of these disciplines. Nevertheless, they must not be taken as the ultimate goal, but rather, as viable solutions to reduce barriers and increase interaction and communication.

On a practical level, there are a variety of available applications that can help educators with distance education. Videoconferencing applications, such as Google

Meet or Zoom, assist educators in organizing their online classes. These free audio and video meeting applications allow teachers to communicate with a multiplicity of students, regardless of location. This technology also allows users to set up pre-scheduled meetings, record the meeting, and even produce automatic captions from voice recognition software (Dudin M.N., Bezbakh V.V., Frolova E.E., Galkina M.V. (2018).

Speech recognition tools could be applied to both distance education or in-person education. The mechanism consists of a dictation software that applies voice recognition algorithms to identify the spoken languages and convert them into text accordingly. It is an excellent instrument for educators to have an automatic transcript of the lectures and share them with their students almost instantly. At the same time, this technology allows students to fully engage with the teacher's speech, eliminating the necessity of taking notes while the teacher is explaining. The technology could also be used for translation purposes, having the capacity to convert enormous amounts of documents from the source language to the target language precisely and efficiently.

Screen recording programs (e.g., Screencastify, Flashback Express, OBS Studio, ActivePresenter) allow teachers to record the PC's browser, desktop, webcam, or sound; the recording can then be downloaded or shared directly to students via e-mail, YouTube or Google Classroom. Some of these programs have the possibility that after the capturing phase, teachers may trim, cut, split the recording, change the volume or speed, add closed captions, annotations, or animations.

Google Classroom is one of the most popular tools among classroom organizer applications. Once teachers sign in and create a class on the tool, they may be able to manage the workflow, quizzes, materials, essays, student's assignments. It allows teachers to collect, review, and grade all assignments in one place. This application streamlines the process of sharing files between teachers and students and aims to simplify the creation, distribution, and grading of assignments in a paperless way.

As whiteboard tools as Jamboard or Ziteboard let educators generate multiple boards or frames on the screen. It is versatile, considering that the teacher can write, draw, select a specific grid or background, add images, PDFs or notes, and even invite students or other teachers to collaborate. The whiteboard can also be shared or downloaded.

Cloud technology is another popular tool used by all types of users, including educators. Cloud computing is the delivery of different services through the Internet.

These resources include tools and applications like data storage, servers, databases, networking, and software. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software programs to run it. (Frankenfield, 2019). Gratitude to the cloud technology, the days of carrying around heavy books from home to the classroom are soon to be an edge of the end. Cloud technology is helping students' backs and reducing the impact on the environment, but it also helps educators have direct engagement data, e.g., how long students take to complete an assignment without taking into upon "the note-taking procedure".

Visual images always have a strong appeal compared to words. Using projectors and visuals to aid in learning is another form of great technological use. Top institutions around the world now rely on the use of amazing PowerPoint presentations and projections to keep the learning interactive and exciting. Technological use such as projectors within the schools and colleges can take the interaction and interest levels right up and improve motivation. Students like to see appealing visuals and something that entices them to think rather than just reading words. The learning part also becomes pretty efficient when it comes to technology (Nagasubramani, P. C., & Raja, R., 2018).

Virtual reality (VR) and augmented reality (AR) have recently been implemented in some fields of education. The development of such technologies could help educators with presentation strategies, designing, and class demonstration. Virtual reality (VR) is a computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors. (Oxford University Press). This technology permits the formation of immersive virtual environments (IVE), which are artificial, interactive, computer-created scenes with high-resolution projections and 3D graphics that allow the user to be present and interact with a computer-simulated environment. This technology could be applied at an educational level to present geographic locations, events, blueprints, 2D and 3D models, designs, equipment, medical imaging, and building structures.

Augmented reality (AR) is defined as a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. It is an enhanced version of reality that uses technology to overlay digital information on an image of something being viewed through a device (such as a smartphone camera). (Flood, K., Glaeser, R., & McMillan, K. 2017). AR could also be defined as an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory (Schueffel, P. 2017). It allows the presentation of superimposed computer-generated graphics onto a person's view of the real world and demonstrates to students a set of physical circumstances. This technology has been implemented in classrooms by Google's Expedition program, taking smartphones into virtual reality. This technology could potentially be applied to education in many ways, for instance, taking students on a 'visit' of a geographical location, museum, event, and alike.

It is necessary to mention that online degrees now have become a widespread phenomenon. People wish to take up online courses for their learning and certifications.

Top institutions offer amazing online programs with the use of various applications and the Internet. This is a concept that will continue to rise as it gets more support and awareness. The online degree scenario worldwide is better known to students who work and look for flexible studying programs (Nagasubramani, P. C., & Raja, R., 2018).

The development of new technologies is affecting in-person education as well.

Biometrics, face, and fingerprint recognition technologies can help identify students, teachers, and administrative personnel, e.g., for entering the university campus, the dormitories, or borrowing books from the library. The implementation of 3D printing technologies in school is revolutionizing the art of presentations, designing, and modelling. It can be implemented to create machine parts, jewellery, and others. It is especially important for future engineers, inventors, and designers. The application of chip tracking uniforms or GPS bracelets can alert parents and teachers when students bailed from class.

Although the majority of advancements in technology that have been implemented in the educational field have complemented, enriched and transformed education for the better, there have been a few cases where there has been a backlash. Such is the case with the implementation of "headbands" (Focus 1 device created by BrainCo) to study pupils' concentration levels recently applied in China. This technology was implemented by Xiaoshun Township Central Primary School in Jinhua, Zhejiang province, had been wearing the headband to measure electric signals from the neurons and translated that into an attention score. The information was then sent to teachers and parents to inform on how focused students were on their studies. The technology was developed by Zhejiang BrainCo Technology, but was suspended in November 2019 after an

overwhelming wave of criticism on state and social media. (Pinghui, Zhuang).

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# The SMILE Project – A Systemic Approach to Creating an Inclusive Educational Environment

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*Scoala Primara EuroEd Iasi, Romania[4,5]*

## Abstract

*The article is based on the SMILE project, under the Erasmus+ Programme, which is being implemented in four European countries: Greece, Romania, Portugal and Bulgaria, the last country also being the project coordinator. The project aims to transfer and scale up a Model for a systemic approach to inclusive education which was initially tested out and applied in Bulgaria. The Model and its self-assessment instrument enable teachers to create an inclusive school environment relying on four educational areas: shared and visionary leadership, inclusive pedagogy, child safeguarding and partnership with parents. The article outlines the objectives and methodology of the project and focuses on the main findings that have emerged from the teacher training course on inclusive education delivered in Romania. The training sessions are designed as workshops that encourage active participation (expressing opinions and sharing experience) with a view to actively implementing the ideas generated by each participant school during the training. This strategy allows for schools to adjust and apply to their context what has been acquired, and also later discuss with the other participants, share experiences and fine tune them.*

*Keywords: inclusive education, school, teachers, model, training*

## 1. Introduction

The European Commission encourages its Member States to look more closely at particular areas of their education and training policy. Romania is aiming at modernising its education system but this process is advancing slowly. Investments in education are low, especially in pre-school and school education, which affects the quality of the education system. Thus, early school leaving, the rural-urban gap and the inclusion of Roma and Special Educational Needs (SEN) children remain challenges [1].

- The main objective of the Smile project is to transfer and scale up an educational Model aiming at creating an inclusive school environment. The project enables teachers and leaders of educational institutions to address their learners' diverse needs by ensuring provision of methodological and organizational support. The project meets a common need to establish a European shared vision and a road map about inclusive education in all countries [2].

## 2. The Implementation of The Project

### 2.1 The Recruitment of Schools

The implementation of the project started with the recruitment of the schools interested in inclusive education, which was followed by the training of the interested teachers. From the very beginning the participants were open to the project's ideas and thought that the project's activities could be easily integrated in the general action plan of their institutions. All of them agreed that the SMILE Model and its self-assessment instrument promotes a framework for school organization and suggests a detailed prioritization of problems and needs, which may lead to a successful planning of the activities meant to improve work in all school departments.

Considering the context (the school year makes it difficult to have common trainings with all 30 participants) two training sessions were planned in each school and a final common one during the winter holiday. Training sessions were supposed to be organized as workshops encouraging active participation (expressing opinions and sharing experience) and accompanied by the implementation of the ideas presented in the training session by each school. This strategy enabled schools to immediately apply to their context what they had been trained and then to discuss this with the other participants at the next sessions with a view to sharing their experience and improving it.

### 2.2 The Smile Training

The participants were asked to complete a baseline questionnaire, which aimed at identifying participants' attitude towards inclusive education and their experience in this field. All teachers support inclusive education; as for the beneficiaries of inclusive education their answers vary: pupils with special needs (impairments), children and teachers, pupils from disadvantaged areas, Roma pupils, all pupils, staff and parents.

Some respondents considered that teachers and counsellors were responsible for the inclusive education in their school, most of them considered it is the teachers, staff and managers' joint responsibility.

The graph below shows that most of the respondents had a long experience (5+) supporting schools to work on diversity (average rate: 3.9), inclusive education (4.1) and organizational change for inclusive education (4.6). The average rates for their confidence to support schools to work on diversity and inclusion are also high ranging from 3.9 to 4.1 (Figure 1).

*Fig. 1.*

**EXPERIENCE and CONFIDENCE in IE (1)**
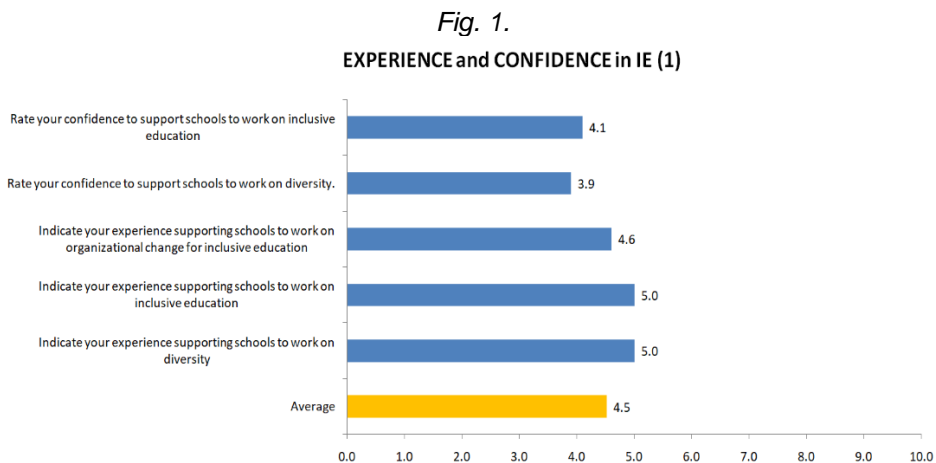
The participants gave several definitions of diversity. Most teachers agreed that diversity may be defined as follows: 'Most of the answers defined diversity as flexibility and tolerance towards children's differences related to gender, religion, social environment, health, etc.; it should include all children regardless of the existing differences. Generally, in their opinion, it means being different. They agreed that diversity refers to a heterogeneous society from cultural, social, political, economic, etc. perspectives. Therefore, the definition may have several versions. For instance, cultural diversity refers to languages, traditions while religious diversity stems from people's beliefs. Another teacher stated that cultural diversity encompasses a dynamic process of exchanges, dialogues, negotiation among groups of people, identification of a common language and space. 'Diversity in a school resembles diversity in a community.

We usually consider diversity in terms of SEN children. This is supported by the fact that Romanian society used to be homogeneous for a long time [3]. However, its coordinates have changed dramatically in the last decades. It would be dangerous not to explore the concept in terms of its cultural, religious or gender connotations. 'As for teachers' attitudes towards students with disabilities and how far they agree with the idea that these students should be in the mainstream the lowest scores got: the students with academic achievement behind their class (3.2), students whose speech is difficult to understand (3.3), students using sign language or communication tables (3.2), students unable to hear (3.4).

As for their preparation to support the implementation of inclusive educational practices in their school, the teachers gave quite high scores (the lowest being given to applying multisensory and interactive methods – 3.9 and to identifying the learning difficulties of their students in a timely way – 4.3). (Figure 2 & 3)

*Fig. 2.*
## To what extent do you feel prepared to support the school team ..
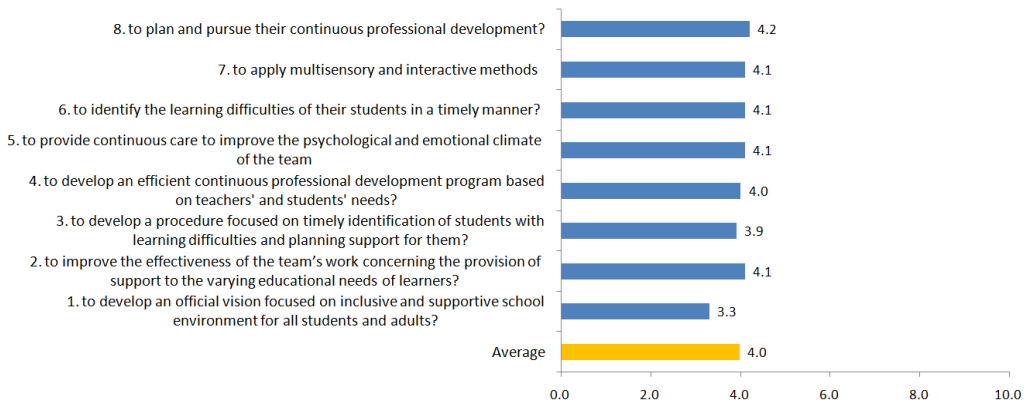
*Fig. 3.*

**To what extent do you feel prepared to support the school team ...**
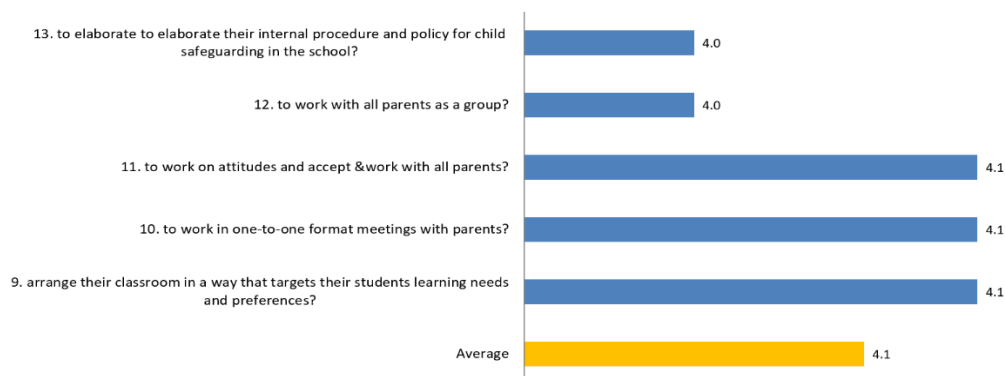


The training also focused on the Model, its domains and descriptors: *school leadership, Inclusive teaching practices, child Safeguarding, and Partnership with parents.* The participants were familiarized with the self-assessment instrument, the introduction of which would enable them to build a shared vision, direction and objectives for the development of their school inclusive environment.

After the first training session, the Instrument form was completed individually by all participants at home. Everybody agreed that the instrument was an innovative tool helping them to assess and analyse their school inclusive environment. Moreover, the instrument will help them to develop an inclusive culture and implement inclusive practices in their school. In order for the teachers to see the progress the self-assessment instrument can be used at the beginning and at the end of the academic year. At the next stage each indicator in all four domains of school development was discussed and the scores given by all team members were negotiated until a shared assessment score was decided upon. After the general score had been decided upon, the team negotiated which indicators they would choose to work on during this school year. They analysed the indicators that had a low score (level 2) and used the questions suggested for Level 2:

- What could improve the efficient application of the policy/practice in school?
- Who in the school can make this happen?
- What do they need to make it happen (time, finances, support from co-workers, knowledge, skills, external support)?
- Why is it important that we do this? What will be the benefits for the school, students, teachers, school management, and parents?
- Could this be ignored and not improved – now or in general? What are the risks?

They agreed on the following indicators: 1.3 and 3.2. The teachers decided on two teams to work on the two indicators; they devised the action plans and decided that each team meets every month to achieve the objectives of the action plan. The participants stated that while working with the instrument to identify the sensitive issues in their school inclusive environment they realized how useful the instrument is for their school.

Not only will it help them to evaluate and improve the inclusive educational environment in their school but it will also simplify their work by structuring it and giving it focus. The instrument helped them prioritize their activities and channel their forces to bridge the existing gaps.

### *2.3 Discussions*

Everybody agreed that the Smile Model and its instrument (when adequately applied) will certainly enable teachers to support diversity and inclusion in there. Thus, the project helps teachers to implement inclusive practices, which address negative cultural attitudes and misconceptions.

The feedback administrated at the end of the training course (October 2019/January 2020) was positive. Participants' feedback assessed their perception and feelings about the training experience. A scale 1-4 (1-I totally disagree; 2-I rather disagree; 3-I neither disagree nor agree 4-I agree; 5-I completely agree) was used.

All participants' opinion was that the goals of the training sessions were clearly stated and achieved. All of them considered that the topics were relevant to their context and developed in a very well-organized way. They said that the discussions had been interesting and useful and highly encouraged them to share their own professional experience and knowledge.

The participants appreciated the materials as being useful and in tune with the new trends in education. They thought that the training course provided useful information, which can be easily applied to their work. The part of the training which they liked most was the self-assessment instrument which allowed them to assess their school inclusive environment and devise an action plan to enhance the quality of their work in their school.

This will enable them to improve the existing situation and implement inclusive principles in their own context.

## 3. Conclusions

The Smile project promotes a systemic approach which helps schools to create an inclusive environment in four educational areas: shared and visionary leadership, inclusive pedagogy, child safeguarding and partnership with parents.

The Model highlights the role that the school's partnership with parents plays in implementing inclusive education [4]. The Model not only raises awareness about the role that inclusive education can play in a community but also provides reliable self-assessment instruments for evaluating schools' inclusive environment and offers support for the development of a school culture on diversity.

The Model and its instrument (when adequately applied) will certainly enable teachers to support diversity and inclusion in their schools and create an environment where those with additional needs are no longer perceived as 'other' but are part of the same community.

Thus, the project helps teachers to implement inclusive practices, which address negative cultural attitudes and misconceptions.

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# Art Education

# A Dictionary for the Collaboration between Schools and Arts Centres

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## Abstract

*The future of education is social and creative. Everywhere, governments are stimulating programmes fostering the creative development of children and supporting the collaboration between schools and societal partners. In this paper, the main conclusions of a qualitative analysis of interviews with art teaches and generalist teachers will be presented in the form of a dictionary, explaining the different interpretations and associations the teachers have of crucial aspects such as content, creativity, didactics, learning, safety, space, and structure.*

*Keywords: arts education, collaboration, professional identity, creativity, school organisation, professional development*

## 1. Introduction

This paper presents the first results of an analysis of the collaboration between generalist teachers and arts teachers in primary schools in the Netherlands. Participants were active in a government-sponsored programme aimed to improve the quality of arts education in schools. Such professional and institutional collaboration is dependent on many factors. [1] This paper asks the question: Which factors determine successful collaboration between regular teachers and arts teachers? It does so by evaluating their personal experiences in the programme.

## 2. Methodology

Based on a qualitative study of a state-sponsored programme stimulating the collaboration between primary schools and community arts centres in the Netherlands, this paper presents the results of a discourse analysis of interviews with generalist teachers and arts teachers on their professional identities and in-class interaction. Eight pairs of participants were interviewed three times during one school year on their assignment and role within the organisation (interview 1), their collaboration with the other (interview 2), and their self-perception and perception of the other (interview 3).

The resulting 24 hours of audio recordings were transcribed and analysed using Atlas.ti. The transcribed interviews were repeatedly coded, starting with in-vivo coding and building up to more abstract codes. These codes were subsequentially analysed on groundedness (code occurrence frequency) and density (code co-occurrence frequency). Some codes turned out to be common in both lists, such as (understandably) 'the arts' and the code 'normal'. Other codes are not very grounded, yet are strongly related to other codes. This applies largely to the definitions of self and others, in sentences such as 'I am just a teacher'. In the following, five code groups that connect the vast majority of individual codes will be discussed: colleagues, failure, identity, space, and structure.

## 3. Findings

### 3.1 Colleagues

There are few things teachers talk about as much as their colleagues. Of the slightly over 200 times the code 'colleague' appears in the interviews, it co-occurs more than 130 times with words like 'good', 'success', 'satisfied' and 'beautiful'. Moreover, it co-occurs more than sixty times with 'nice'. It seems clear that colleagues are an essential condition. At the same time, however, they the greatest risk for the success of collaboration in arts education.

The colleagues mentioned are often connected to the collaboration between the school and the arts centre. Because the involvement of colleagues is very important for the quality of arts education, this requires constant attention. According to the interviews, a good arts teacher can work wonders with a beautiful workshop or inspiring sample lessons with the teaching team. If that does not tile the necessary results, which also occurs, the effect will be limited to the one teacher with whom they work. In that case, the goals of the government programme will not be met.

A strong turnover in the team prevents the creation of an 'effective learning community'. Watson [2] emphasizes that in a heterogeneous setting, a shared vision and system of values is lacking almost by definition. Identifying and naming the underlying values is therefore crucial in this context.

### 3.2 Failure

Arts teachers and generalist teachers often stress the role of failure in arts education.

Collaboration therefore requires trust. McAllister [3] distinguishes two forms of trust: trust based on cognition and trust based on affect or feeling. The first, more rational form is based on trust on formal grounds, such as diplomas; the second is based on personal experience. Although the two forms of trust clearly differ, McAllister did discover that a certain degree of cognition-based trust is a precondition for the development of affective trust.

Interviewees indicate that while the official discourse is that failure is accepted, teachers feel that it is not actually tolerated. This strongly determines the teachers approach to teaching and learning. Fear of the reaction of parents is also sometimes mentioned as a reason to be reluctant in overly creative ways of teaching, assessing, and task design. The fear is thus both internal and external. The internal fear is closely related to the professional identity of the teacher, who has learned to deal with teaching content, working methods and pupils in a certain way. This way is often at odds with what arts teachers have been taught.

The external fear is more difficult to remove by an individual arts teacher, or a collaborating team of generalist teacher and arts teacher. They do not know to do with a "culture of fear", as mentioned in one of the interviews, and feel that they are struggling to meet the expectations and demands of parents and society. Pupils can also be afraid to do something new, but in that case, the discussion is about the didactic question of whether it is possible to create a learning environment that is safe enough.

### 3.3 Identity

In the interviews, teachers not only talked about themselves, but also about others.

The second interview focused primarily on their collaboration. The word that occurs most often under the identity code is 'just' or 'only' (as in: 'I am just a teacher'). The differences are self-evident for both parties. While recognising the existing differences, interviewees also express a need for overlap: a generalist teacher who dares to experiment and an arts teacher with strong pedagogical skills.

The way a teacher teaches has everything to do with her identity as a teacher. In research, more and more attention is paid to the role of emotion, passion, commitment and daring in teaching. Professional identity is multiple, discontinuous and social in nature. Identity changes, not gradually but step-by-step, it is contextual and social. [4]

Participants in the research also see a common ground. Generalist teachers and arts teachers often share a vision and ambition. The challenge lies in balancing the expertise and goals that can be achieved through collaboration; this is a quest that requires both parties to be open.

### *3.4 Space*

Interviewees mention 'space' over three hundred times, often metaphorically. It is invariably about a lack of space, a lack of time and a lack of freedom. According to Biesta *et al.*, [5] learning and teaching is 'situated' and requires agency. When the context determines the teaching and learning process, a teacher must constantly adjust his or her own actions.

Space is also perceived as limiting in a physical sense. For art classes, especially the performing arts, teachers are obliged to move to the gymnasium, the corridor, or the kitchen. Little wonder that arts teachers regularly complain that they would like to have their own space in school.

The arts teachers express longing for their studio as a space to work in. However, a studio is also a way of thinking. Studio Thinking is a way of approaching the subject matter and of teaching, learning and collaborating. [6] Arts teachers indeed associate the studio with not only their personal freedom, but above all with that of the student.

### *3.5 Structure*

The classic image of the orderly, tranquil and uncreative teacher is still regularly reflected in the interviews. The word 'order' is invariably mentioned with words like 'rule', 'rest' and 'structure'. Deci and Ryan's self-determination theory indeed states that a sense of autonomy and stable relationships are a prerequisite for good professional practice. [7]

The image of the arts teacher is the opposite. Arts teachers indicate that they have learned a lot in this area from the teacher with whom they work. As one teacher points out, the focus on order also has to do with the fact that the group teacher works with the children all day, every day, and the arts teacher always comes for an hour.

Structure plays a role on all levels of collaboration. At the macro level, it is about the structure of education and standardised testing. At the meso level, it is about the way in which the school itself is organised. At the micro level, the personal beliefs and preferences of teachers play an important role. In addition, the professional identity of the teacher comes into play.

One way of researching the place of art in education from this perspective is to consider the school as an ecosystem. A change in that ecosystem, such as integrating art and culture education into the curriculum, depends on different levels within the school's ecosystem. At the micro level, it is about the convictions and values of the teachers. At meso level, the mutual interaction within the school team and the involvement of team members in the change process play a key role. At the macro level, social conventions determine what is seen as desirable and successful.

## 4. Conclusion and Discussion

What does a word mean for a schoolteacher and what does it mean for an arts teacher who comes from outside to the same school? How would that arts teacher use

this term in his or her own professional, extracurricular context?

By speaking with the arts teachers and the generalist teachers together, we have tried to gain insight into the encounter between both world and self-images. Successful collaboration, it may be tentatively concluded, depends on mutual understanding and recognition of differences in professional approaches. It requires overcoming the limits of one's way of 'reconfiguring' the world. That is the boundary where learning begins. In this research, I have tried to capture this boundary of what might be called 'mutual amazement'. This implies the ability and willingness to explore the borderland between the worlds of school and the arts.

The three rounds of interviews clearly showed that the connecting factor between the different aspects of working together is how generalist teachers and arts teachers look at themselves and each other. This is the key to successful and fruitful interaction in the classroom and at school. This is not only true for the single pair of generalist and arts teacher working together in a classroom, it is equally true for the team in the school and in the Centre for the Arts. It is also true for the way in which governments look at arts education and the assumptions and expectations regarding the professional identity of the generalist teacher and the arts teacher that are hidden in a funding scheme.

It is important to think about the narratives about art and culture in education and the roles that generalist teachers and arts teachers must and want to play in this, from the moment the subsidy scheme is drawn, up to the moment when the first lesson starts.

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# Active Pedagogy in Art and Design Education – Case Study on the Heritage and Semantics of the Portuguese Graphic Tradition of 'Azulejos'

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## Abstract

*The following paper acknowledges multidisciplinary connections enabled by media to communicate the symbolic and historical value of the Portuguese tradition of tiles on facades, particularly in the city of Porto. It is developed within the context of Anti-Amnesia (POCI-01-0145-FEDER-029022), a design research project that seeks to sustain disappearing traditional industries and practices in northern and central Portugal. The educational resources that are built focus on writing and reflecting upon the pedagogical activities themselves, in the form of scientific contributions to the higher education community involved in art and design. The tiles (Azulejos, in Portuguese) have been a defining feature of Portuguese architecture for centuries, but the practice has steeply declined in scale and authenticity with the advent of more mechanized alternatives. Acknowledging this heritage, the research is framed around the study and recognition of the associated historical and semantic capital. The research is further aided in understanding the related socio-cultural contexts by a Porto based entity "Gazete Azulejos" who aim to create a digital archive of original Azulejos designs in the city. The project sees such ligations with on-ground interventions based on contemporary design and communication as viable grounds for revaluation and resurgence of traditional forms of creativity.*
*Design's role towards the continuity of historically significant but antiquated traditional practices involves gaining a greater visibility of emerging strategies that are being employed in response to real-world issues concerning heritage management. This guideline bridges with an educational insight: digital media and digital archives, properly organized and made available for public domain, allow for necessary conditions to investigate the selected case-study. The paper thus describes a pedagogic project developed with undergraduate students of graphic design outlining the conducted research, creative development, and learnings. The paper discusses how such case-based integration invites the rethinking of design instruction itself, acting according to the perceptions of the contexts, interpretation of various dynamics, and experiences of the students. The opportunity to combine a creative research project with the cultural heritage of an urban territory also allows learning-based interactions between students, artists, activists and local culture, leading to intergenerational and interdisciplinary networking and know-how transfer.*

*Keywords: Art and design education; higher education; Portugal; Azulejos*

## 1. Introduction

Project Anti-Amnesia (POCI-01-0145-FEDER-029022) is a design research project that seeks to sustain disappearing traditional industries and practices in Northern and Central Portugal [1], conducting design-led research interventions and educational strategies that focuses on securing and sustaining systems of traditional knowledge and intangible value prospects embedded in craft and small scale industrial practices. Under these circumstances, it identifies the heritage and semantics of the Portuguese graphic tradition of 'Azulejos' as a case study that conforms to the aforementioned assessment, and consequently, procures means for constructing an evidential base that can potentially aid in its cultural appraisal and reactivation.

## 2. A Pedagogical Model: Anti-Amnesia

The project's conducted research sees an ongoing reversion of its outcomes into multiple contexts of related socio-cultural appropriation through a "build-measure-learn" loop, a significant extent of which is attained by the means of curricular participation from design students. The student participants engage directly with the project's subjects and objectives through an array of impact-focused workshops and curricular work, including design ethnography and supporting multi-disciplinary actions relating to the recovery and restoration of heritage and visual semantics.

Integrated in the process of higher education in graphic design, within the structuring domain of design project, the pedagogical process identifies as main objectives: (i) to explore the grammar of communication design; (ii) to identify attitudes and methods used in the design environment. (iii) to adapt the aesthetic objectives of design to the effective possibilities – methodological, technical and productive – of graphic production; (iv) to develop reasoning and creative stimulation in a project, embodied in the history of visual communication and in the praxis of contemporary graphic design; and finally (v) to develop the capacity for critical thinking in relation to the different perspectives of Design, their role in society and tangencies.

By these objectives, one does not just try to solve the problem, it is also deliberate to try to improve the educational activity. In this type of research and project development, one is not only concerned with interpreting the presented situation but simultaneously with changing the situation and the educational actors. For students, this learning-based engagement with real world scenarios adds two substantive vectors: it is a formative, contextualized, reflective and collaborative learning experience in the construction of knowledge and design practice; and it is a transformative experience, as it involves itself in these real-world scenarios and in their experience. The synergy that was eventually created between the various involved entities, including students, artisans and researchers, became central to realizing the project's primary expectations. Its implementation structure allowed for a conducive execution time frame for the undergraduate students to acquire and act upon specialized knowledge.

## 3. The Portuguese Graphic Tradition of 'Azulejos'

Portugal's well-known 'Azulejos' tiles are in a state of flux. The original hand-printed version of the practice may have long ceded ground to more mechanized forms; however, its legacy, marked by century-old artefacts that still adorn building facades, is disintegrating rapidly. As urban centers such as Porto expand and accept newer architectural paradigms, *azulejos*, a cultural archetype from an earlier era, transforms into a thematic discourse. The symbolic value of the craft, as a cultural marker, thus

gains more significance than its material and processual heritage.

Project Anti-Amnesia thus lays particular emphasis on gaining visibility of emergent actions that are being employed from within the wider creative community towards issue.

Traditional techniques and practices are inevitably affected by the inconsistent economic and sociocultural circumstances; however, it is often possible to locate endogenous movements that undertake reformatory measures.



*Fig. 1. The stolen tiles from Porto's facades make a striking argument
for the enduring value of originality*

The active pedagogy involved collaborating with 'Gazete Azulejos', an initiative the project considers as a relevant subject of study towards gaining an understanding of the tradition of tile making in Porto, as its aim is to revive and sustain the authenticity factor behind the original craft in the absence of a dedicated community of practice.

Consequently, the Porto-based initiative represents the sole instance of an entity that is currently involved in the production of hand-painted tiles, in any capacity, in a city that was once home to several tile-producing kilns, the last of which ceased to operate in the 1980s [2].



*Fig. 2. Azulejos' patterns (sample) retrieved from Porto buildings, archived at
www.instagram.com/azulejosporto/*

As a result of its restorative measures, the initiative represents an intervention scenario which not only promotes active community-based creative engagement with a heritage craft and its associated concerns but also communicates the undiminished value of a local traditional practice to a global audience. Its three-pronged strategy for cultural reconsideration essentially includes design, documentation, and dissemination: as a methodological approach, this falls in line with Anti-Amnesia's articulations.



*Fig. 3. Workshops provided by 'Os Azulejos do Porto' entail a communal call to action*

Integrated in the degree (BA) in Graphic Design of the School of Design of the Polytechnic Institute of Cávado and Ave, the collaborative pedagogic undertaking with Gazete Azulejos (under ambit of project Anti-Amnesia) interprets an educative insight that introduces the heritage and semantics of Azulejos tilemaking to a future generation of designers, which may aid in the continuation of the associated creative and processual legacy in future contexts. Although there is a great heterogeneity in the graphic language of the student's projects, in most of the works developed there is a concern for exploration and creative experimentation, in trying to validate specific skills tied to different areas of their curricular structure. By exploring and discussing the bases of design, the exercises present a wide range of creative possibilities through graphic design, exploring the limits of the discipline in parallel with a reflection on its methodological grounding. The students were also invited to explore the digital archive being built by Gazete Azulejos, towards gaining a first-hand understanding of how contemporary design and communication can help preserve and promote intangible values embedded in traditional creative techniques and practices. The creative briefing additionally urged the students to recognize the specific potential of three-dimensionality for the conceptualization of a graphic message – the dichotomy of "expected/unexpected".

The overall results corresponded to expectations, with a number of responses distinctly showcasing quality and applicability. The structuring and organization of the project in different phases supported by the methodological model provided conditions conducive to enhancing the students' creative capacities and motivations.

## 4. Discussion

The integration of research projects, with design education can enhance instructional methodologies and strategies, requiring educators to build upon their role in a teaching-learning dialogue. This also contributes to adding new contexts to the dynamics of the classes, enriching the activities and inviting students to explore, take risks and actively engage in the search for primary information, which refers to the themes at work.

The context in which the Design discipline operates today is holistic, being an area of investigation that dialogues with other areas that are dedicated to the construction of messages, realities and artifacts. Its main objective is to develop idiographic knowledge, in a pedagogical and professional reality that is dynamic, multiple and comprehensive, highlighting the interpretation of these assets as fundamental ingredients for the creation of a well-founded visual discourse.

A learning ladder is established between understanding, meaning and action, which is added here to the students' training process, by active processes and pedagogical construction, which are not previously observable or susceptible to experimentation – they are built in the context of the Anti-Amnesia project itself research and contribute to the modelling of a design pedagogy [3]. In this way, the pedagogical process is motivated and open to the exterior, maintaining and stimulating in the students the habit of questioning about what surrounds them; it provides an accurate view of the role of design, higher education and learning, which is built at the service of knowledge and understanding of the world and real problems; provides greater motivation on the part of those who will learn.

The developed activities and the dynamics of practical work in class allowed students to consolidate knowledge and skills on research and experimentation processes related to graphic and visual communication, through motivating work assignments. It was also integrated, as proposed in the program, the identification of the historical and semantic capital of graphic design as fundamental ingredients for the creation of a reasoned visual discourse and autonomy in the development of projects.

The educators, as mediators between students and research projects, and also acting in the fundamental role of a researcher, are in a prominent position to reflect on learning, collecting and interpreting data and propose decisions regarding teaching, and constructing an applicable pedagogical model. It is important that classrooms are also living laboratories for research and are also able to transform and be transformed. The educational resources that are built have a lot to do with writing and reflecting on the pedagogical activities themselves, in the form of scientific contributions to the higher education community involved in design. In this way, the participatory pedagogical approach is projected in the following pedagogical guidelines:

- it is revealing, as it proposes a proven transformation in specific and contextual narratives, which reinforce the established patrimonial relationship. It rehearses a holistic vision that treats design as a method of narrative content, opens space for dialogue and awareness of its own heritage.
- it is substantive, as it expresses a specific substance of the place, places and all the citizens who are actively involved. Design and its actions will always be a meeting point.
- it is participatory, as it believes that the viability of this pedagogy will pass through this media interpretation, finding in craft's heritage a ubiquitous and practical resource, which contributes to the emergence and support of this dynamic.

In this way, Anti-Amnesia's research is being reformulated itself, taking into account new questions and answers that emerge from the pedagogical practice. This evolution invites the implementation of changes in the teaching context itself, acting accordingly to the perception of the contexts, the interpretation of the dynamics and experiences of the students, and acting accordingly to this same analysis. Active pedagogy wants to contribute to these challenges of innovation and change and Design, in this form, moves from specialists to a universe of participation, and creates an opportunity for inclusion of subjects traditionally disconnected from themselves.

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# Exploring Formative Routes, Opportunities, and Events in Music Education

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## Abstract

*This paper analyses the narratives of five professional musicians, involved in popular music, aiming for an exploratory overview of their individual formative routes, events, opportunities and influences. Through retrospective accounts, these musicians reflect on the influences and opportunities that have contributed to their professional choice, and, thereby, providing some insights relevant to music education and culture in this digital age, in Portugal. As participant's routes are alike, but share an involvement in popular music as teenagers, a special focus is placed on issues concerning the characteristics of their musical environment. Also, the role of school music within those lives, the relative influence of school experiences, and the significant peer influences and models that seem sustaining and fostering their musical involvement and identities, are analysed. Issues on music education, in its varied contexts and ways, are debated and draw upon writings on informal learning in music and the implications are of concern to student, educators, and policy makers.*

*Keywords: formative contexts, music education, music learning, musicians*

## 1. Introduction

Issues on music education are often debated and drawn upon research on some important features that come from the study of synergies between school music in its varied contexts and on ways the home and the various sociocultural environments are important. Studies underlining the impact of home and school on lifelong musical interest [1] opportunity and motivation [2], and the quality of the musical interactions, situation and learning experiences are important factors on the way music is used, and valued.

These experiences may be relevant on shaping attitudes, choices and identities towards a lifespan musical involvement but also in 'creating' their own selves, and in representing themselves to others, as seen also for the Portuguese context [3, 4].

As a process, "education continually redefines its meanings" [5], and many changes and challenges have been observed in the educational system, related, for instance to a formal framework definition for validating the non-formal and informal learning experiences and their certification. In knowledge society, when we reflect upon educational processes associated to the use of digital technologies, changes and challenges are growing. In Portugal, new learning environments emerge [6, 7] and new digital and virtual technologies create wider opportunities in music education through music-related social participation, musical learning and artistic expression that slowly become acknowledged in the field of formal music education [8].

Furthermore, studies concerning popular musician's learning and development [9], events and opportunities that have influenced their lives and contributed to their professional choices [10, 8] have drawn researcher's attention considering its

applications to music education as well as providing a way forward for professional musicians [8].

Manturzeska [11] developed a longitudinal exploratory study of the life-span development of professional musicians collecting empirical data about their life course and on the factors influencing their development and achievement in different stages and fields of music. Other studies have investigated events that have influenced the careers and lives of musicians, examining, in particular, the transitional phase from training to professional life, providing important implications for the education of talented musicians, and methodologically, showing how individuals can be traced over a long period of time [10].

In line of the mentioned, this exploratory study focuses on the analyses of the narratives of five musicians involved in popular music. It aims for an exploratory overview of their individual formative routes, events, opportunities and influences in music.

## 2. Methodology

The specific context addressed corresponds to the Leiria region, located in the littoral centre of Portugal. The selection of five case study participants took into account the need to cover different genders and levels of education, having as common denominator being popular musicians from the same region. Participant were 2 female musicians (FM 1 and 2) and 3 males (MM 3, 4 and 5), aged between 23 and 48 years old.

It was intended to unveil and interpret the formative processes they experienced, understanding the interviewees' worlds of life and specified social groups, and exploring the spectrum of their opinions and the different representations on the subject in question [12]. As participant's routes are alike, but share an involvement in popular music as teenagers, a special focus is placed on issues concerning the characteristics of their musical environment. Also, the role of school music within those lives, the relative influence of school experiences, and the significant peer influences and models that seem sustaining and fostering their musical involvement and identities, are analysed.

Taking into account the specific context, the circumstances described above, and the aim settled, this study may be seen as exploratory [13] and, still, descriptive, as the collected data intend to originate detailed narratives of five musicians involved in popular music. It aims for an exploratory overview of their individual formative routes, events, opportunities and influences.

Semi-structured interviews were used focusing on musician's experience of the theme, providing retrospective accounts and personal narratives of the influences and opportunities that have, in their opinions, contributed to their professional choice.

Ethical procedures were followed with results drew on participants informed consentient. After recorded, data from transcriptions were analysed and themes were identified.

## 3. Findings and Discussion

The main provisional results are expressed through themes that were identified and fell into three broad areas. These were 1) Formal and non-formal contexts of music learning; 2) Sociocultural contexts of music involvement; and 3) Peers influence.

### 3.1 Formal and Non-Formal Contexts of Music Learning

Irrespective of whether the participants had learnt music in formal or non-formal contexts of music education, opportunities and contexts of music learning during childhood, and specially adolescence, were emphasized.

Only FM2 does not recall to have had opportunities in formal music education contexts. Like FM1, FM2 is a popular singer but she did not have formal instrumental or singing lessons during her childhood. She strongly emphasis her family role in providing her with opportunities to music learning as they were closely connected with popular contexts of music practices. Her family were her music teachers, stressing singing activities as a key element for music learning. She refers that "*life was her music school*", emphasizing the importance of music practice and real-life musical experiences.

FM1 and MM1 have higher education degrees, but only MM1 has a degree in the music domain. FM1 recalls about the way some musical learning experiences lived during childhood were important as they provided her with a close connection to music practice. As a child and adolescence, she had music classes in a formal context, in a conservatoire. Besides learning the piano, she had vocal lessons that she describes as very relevant to the development of her musicianship. However, in her opinion, musical learning methods should be more attractive in order to motivate and attract more young people to formal contexts of music learning.

### 3.2 Sociocultural Contexts of Music Involvement

Participant's narratives reveal positive musical experiences associated to the role of music in their lives during childhood and especially during adolescence. These include the combination of parental encouragement and home resources with existing opportunities of cultural consumption, participation, and involvement.

MM2 refers to the emotional experience music has in his life, dismissing the idea of his family as influencers in his musical choices and options: "Nobody in the family played, it was really an individual passion" (MM2).

For FM1, music listening is seen as a central musical experience to which she confers a special meaning. For this professional popular singer, music listening seems connected not only to positive memories that she recalls having had with her family as well as determinant of some of the musical choices she made throughout her career. "I remember my mom had some tapes from Amália and I started listening to a lot of fado" (FM1).

FM2 childhood musical experiences are mostly associated with informal contexts of music practice, either attending her family concerts, as a spectator, as a participant behind the scenes, or helping on the concert's backstage.

FM2, MM1, MM2 and MM3 stresses the importance of opportunities in music provided by the sociocultural context where they grew up. "Although the environment in which we were involved was relatively small, there were a lot of musicians and, at the time, there was some facility in reaching a whole set of musical learning's" (MM1). This view is elucidated by MM3: "I lived in a locality that has a philharmonic" (MM3).

As explain by Pitts [1], "much of the influence on young people lies beyond teachers' control, as parental attitudes, home environment, and cultural consumption shape young people's musical lives in complex and unpredictable ways.

### 3.3 Peers Influences

The strong message from all of the musicians was that practising is seen as a foundation stone of their musical development. Peers influence is recalled has having had a strong role in their musical opportunities and learning experiences.

For FM1, the influences of the musical activities provided by peer's involvement in music projects were an important stimulus towards a professional career in music. She says: "a musician from our area invited me to be a dancer and singer on a project he had and I accepted." (FM1)

MM2 and MM3 also clearly refer to the peer's influence, as they mention: "it was all

that ambition to play in a band, to do some shows" (MM2) and "it was my friends who influenced me to be part of it". (MM3).

## 4. Conclusions

Through this explorative study, we have analysed the narratives of five professional musicians, involved in popular music on their individual formative routes, events, opportunities and influences.

The evidence presented suggested that, for those musicians, opportunities and contexts of music learning during childhood, and specially adolescence, had an important role in their professional choice. The opportunities provided by the sociocultural contexts, including, for some, parental encouragement and home resources and family and local opportunities of musical participation and involvement are recalled as having had particular influences in these musician's life's and professional choices. The practical musical experiences they had during adolescence and their peer's influences seem having been an important foundation stone of these popular musicians' individual musical formative routes, events, opportunities and influences in their lives.

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# Blended Learning

# Dynamic Framework for Project-Based Learning: Interrelate Students, Faculty and Industry, towards 21th Century Job Market

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## Abstract

*The researchers introduce a dynamic framework for effective Project-Based Learning (PBL) aligned with the needs of students, faculty, and industry towards graduating competitive generation for the 21st century job market. The framework represents a triangular beneficial interrelationship among three active parties: student, faculty, and industry where the student is placed in the center of all relationships and interactions. The research investigates the challenges of implementing PBL and explores its benefits from the point of views of the stakeholders, including students, faculty, and the industry. The results provide insights into the lack of clarity in the concept and impacts of PBL as an educational & learning strategy for the stakeholders, given the challenges faced by each of them. The research draws range of recommendations to government agencies and university management in order to facilitate, manage and improve the practice of PBL among the stakeholders while utilizing the opportunities, overcoming the challenges and maximizing the benefits.*

*Keywords: Project-Based Learning, 21th Century Job Market, Framework*

## 1. Introduction

Higher Education Institutions in Bahrain operate within a highly competitive educational environment. They compete to ensure quality of education and the employability of its graduates. The institutions differentiate themselves from its competitors by graduating generation who is capable to meet the demands of the 21st Century job market skills. Project-based learning (PBL) is a form of experiential learning strategy which is designed to improve the perceptions of learners towards the application of discipline-specific knowledge driving by effective interaction among student, faculty, and industry. The aim is leveraging the students' capabilities and orientations towards the 21st Century workplace.

## 2. Research Model

The researchers introduce a dynamic framework for effective PBL aligned with the needs of students, faculty, and industry towards graduating competitive generation for the 21st Century job market. The research investigates the challenges and explore the benefits of the interactive relationships among the stakeholders, as illustrated in Fig. 1.
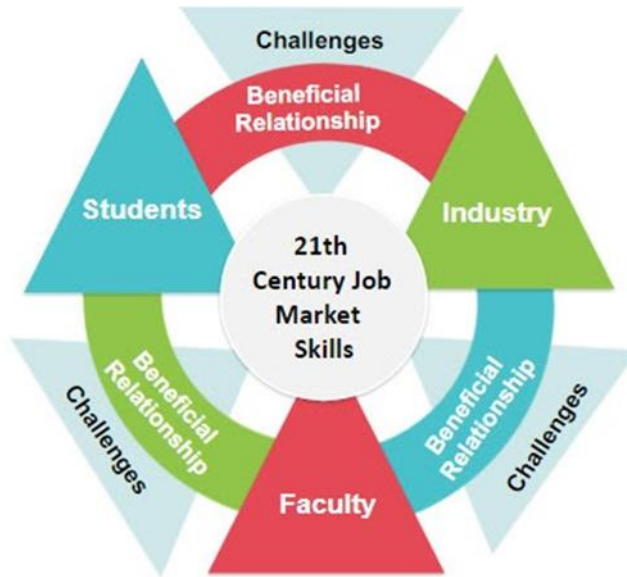
*Fig. 1. Dynamic Framework for Project-Based Learning*

### 2.1 Project-Based Learning (PBL)

The Higher education graduates are required to succeed in today's information economy which is more reliant on skills. There is less necessity of memorizing basic facts and technology has reduced the need for this ability in the educational process.

Scholars consider PBL as one of the most effective active learning instructional practices which is actively engaging the students in real-world and meaningful projects for individuals and groups [5], [6], It exposes students to real-world problems that require a blend of skills and knowledge to tackle; meanwhile responding to the student-centered approach. The role of the faculty is to help the student to build an interdisciplinary knowledge and constructive skills while completing a social activity that enables context-specific and self-awareness of learning and knowing [8]. PBL has many characteristics encompassing authentic assessment, content driven, complex tasks, critical thinking, clear objectives, and realistic outcomes towards real-life problems where student is directed, teacher facilitates and time is limited [7]. PBL is a high impact pedagogy contributing to creating and using knowledge in business-driven technology and information. Most of international and national accreditation authorities consider project-based learning as a criterion of quality of education.

### 2.2 Job Market Skills of 21st Century

PBL framework in this research represents an active triangular interrelationship among three parties: student, faculty, and industry. The central goal of this relationship is the 21st century job market skills. The researchers identified 14 skills necessary to job market, namely, researching, decision making, organizing information, time management, autonomy, initiation, leadership, taking responsibility, problem solving, interpersonal attributes, technology agility, creativity/originality, self-evaluation, and communication. This range of skills are categorized into four broad sets of skills, namely Problem Solving & Decision-Making Skills, Leadership & Communication, Self & Team management skills, and Innovation, Creativity & Technology [1], [2], [3].

### 2.3 Beneficial Interrelations

All relationship and interactions among the stakeholders adhere to the principles of equity, transparency, accountability, and mutual benefit in order to facilitate and ensure effective and advantageous partnering [7]. In PBL model, faculty take a highly proactive role in directing the learning process and students' progression. They become partners with students throughout the learning curve; poor and passive pedagogue is a consequence of considering faculty as mere facilitators.

Using the appropriate strategy to interact with a specific student or group of students to achieve range of tasks shall empower students' thinking and questioning about their learning. In higher education context, the students are expected to promote their ideas, experiences, and expertise as well as mastering their process of learning [6]. PBL Model involves both students and faculty in real-world while taking learning and teaching responsibilities towards benefiting from industry technologies and practicing creativity, critical thinking, and application of multidiscipline knowledge. Solving real-life problems prepares students to compete in the job market; moreover, it helps them to identify their career objectives and preferences in real work context [5]. PBL activates the engagement of the student and faculty with the business community which develops and ensures up to date competencies as well as generates new opportunities for projects and future research. Connections with industry promote the faculty academic performance, career and self-satisfaction. Sustaining and developing active collaborations with industry expand the networks of faculty and students and expedite the engagement in real-life projects [8].

Development of products and services across various industries is an ongoing process where solutions are needed for wide range of real-life problems. Small and medium-size companies rarely have the sufficient resources to carry out needed research and development for the business continuity and growth. PBL with higher education institutions contributes to industry development and support in overcoming limitation in resources and creativity. The business which is collaborating with higher education institutions through PBL, benefits from the fresh minds and discipline-oriented knowledge of the student and faculty [9]. Most successful companies have realized that a team of students can do a good job in their attempts to find appropriate solutions of given problems which shall be reflected in developing problem-solving skills and competences [11].

### 2.4 Challenges Facing PBL

Despite the enormous benefits of PBL for the three parties, several challenges hinder the opportunity to conduct PBL and/or reduce the effectiveness of the process and outcomes. Some higher education institutions cannot meet the high expectations of the industry partner because of limited resources in terms of expertise, time and infrastructure. On the other side, some companies face difficulties in allocating staff and fund as well as identifying problems and desired outcomes from their side which leads to unclear expectation, misunderstanding, superficial results and/or need for lengthy negotiation process. Usually, the companies have limited support staff and resources to facilitate interactions with higher education institutions within PBL Model, while the project time frame lacks flexibility due to implemented academic calendar and insufficiency of physical facilities [10].

## 3. Research Methodology

### 3.1 Questionnaire Design and Interviews

Three questionnaires have been designed to target students, faculty, and industry

representatives in order to investigate the existing practices and challenges facing PBL Model. Consequently, range of questions were devolved to explore their approach and attitude toward PBL as well as anticipated benefits for all parties. Each questionnaire was divided into four parts, first part: general information, second: contribution of PBL to achieve 21st Century job market skills, third: benefit of PBL towards each party and fourth: challenges facing stakeholders to integrate PBL in practice.

Furthermore, structured interviews with the stakeholders were conducted in order to develop suggestion and recommendations to overcome the challenges and enhance the effectiveness of PBL application.

### 3.2 Samples and Statistics

Online questionnaire surveys have been implemented; 378 students, 375 faculty, and 152 industry representatives completed the surveys. Stratified random samples at a 95% confidence level, and an error rate of 5% were adopted.

Out of the total 378 students responded in the survey, 63.64% of students comprise age from 20-30 years, 57.3% of them are females, 50.8% study between year 2 and year 4 in their academic program.

Out of the total 375 faculty responded in the survey 72% of faculty sample comprise between 30-50 years, 56.12% are male, 66.33% are specialized in humanities and literary studies, 62.24% have their experience in teaching more than ten years, all of the respondents have Ph.D. qualification.

Out of the total 152 industry professionals responded in the survey; 52.83% are from governmental organizations and 47.17 are form private sectors with more than 100 are full-time employees.

Cronbach's alpha for students, faculty, and industry respectively were calculated as 0.83, 0.79, and 0. 86, which indicates internal consistency and high reliability of the sample. The descriptive analysis, Multivariate Analysis of Variance (MANOVA) for the difference between the three groups of means and a Scheffe Test as Post-Hoc test were used in statistical analysis to derive significant results from the surveys.

## 4. Study Results

Figure 2 illustrates the average responses of students, faculty and Industry representatives towards the role of PBL in developing the four broad skills set of 21st Century Job Market. The average responses of the three parties ranged between 1.74 and 2.74 where 1 reflects disagreement, 2 reflects cannot determine and 3 refers to undecided. Such uncertainty towards the role of PBL in developing major skill sets demonstrates the deficiency in perceiving the impact and contributions of PBL.
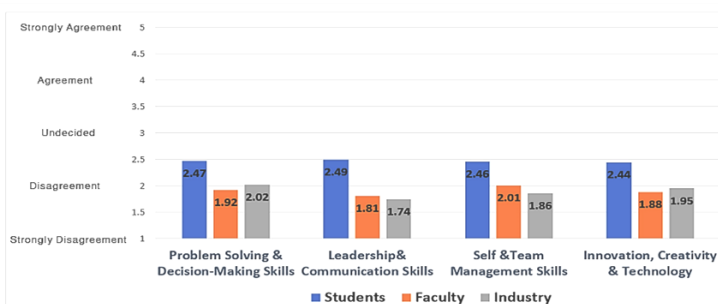


*Fig. 2. Average Responses of Students, Faculty, and Industry Representatives towards Impact of PBL in Developing 21st Century Job Market Skills*

MANOVA test was used to examine the differences in the average responses among the three parties as presented in table 1.

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|--------|--------------------|--------------------------|-----|-------------|------|------|
| Groups | Problem Solving & Decision-Making Skills | .515 | 2 | .257 | 20.766 | .002 |
| | Leadership& Communication Skills | .919 | 2 | .459 | 35.422 | .000 |
| | Self &Team Management Skills | .588 | 2 | .294 | 7.168 | .026 |
| | Innovation, Creativity & Technology | .557 | 2 | .279 | 22.797 | .002 |

*Table (1) MANOVA Test for 21st Century Skills Sets among Students, Faculty & Industry Representatives*

Following section shows the results of the statistical analysis of the survey.

Table 1 demonstrates that the level of significance is less than 5% in all variables which proves statistically significant differences in the four skill sets according to the three parties; students, faculty, and industry representatives. Scheffe Test indicates that the difference is maximum for the students followed by the industry representatives, and the least differences are in faculty responses which means that the students considered PBL helps them to acquire 21st Century skills rather than faculty and industry representatives.

### 4.1 PBL and Student's Stand

The students' average responses towards getting benefits of applying PBL ranged from 2.3 to 2.61 with SD ranged from 1.07 to 1.10. As perceived by the students, their participation in project work results in better class attendance and taking greater responsibility for self-learning than traditional classroom activities. This further provides opportunities for collaboration among students amidst diverse culture and background.

The students' average responses towards getting benefits from industry through PBL ranged from 2.48 to 2.39 with SD ranging from 1.14 to 1.13. Mean values reflect students' perception of getting benefits from industry through PBL with respect to exploring the skills and knowledge needed in job market, identifying skill gap and building a relationship with prospective employers. The student survey results show that there are set of challenges encountering PBL. The most noted challenges are:

- certain projects demand extended time to conduct in depth study (49.73%);
- difficulty to work within a team (44%); extra workload (41.08%),
- challenge in terms of prior knowledge, experience and competencies (38%),
- lack of financial resources allocated to conducting projects (36.22%);
- deficiency of accurate and valid industry data (31.35%),
- and weakness in industry support and cooperation (28.65%).

### 4.2 PBL and Faculty's Stand

The faculty average responses towards getting benefits of implementing PBL with their students ranged from 1.69 to 1.88 with SD ranged from 0.85 to 0.92 which includes the following aspects:

- opportunities to build effective relationships with students,
- introducing range of new learning opportunities to the classroom,
- and awareness about the gap in the job market skills.

The faculty's average responses towards the benefits they get from PBL with industry ranged from 1.96-1.88 (Disagreement) with SD ranged 0.85-0.93. They highlighted the following benefits:

- connections within the business community,

- provide insight into industry needs,
- keep them updated with current and latest industry trends the field,
- create several opportunities to engage in and expand scholarly activities and research projects.

The faculty's average responses towards PBL as a successful Teaching & learning practice was 1.86 (Disagreement) and SD 0.82 which is reflected in the following results:

- lack of contact with the industry and difficulties to transfer practical knowledge (37.57%),
- inappropriate learning facilities which limits implementation of PBL (36.51%),
- difficulties in collaborating with colleagues to initiate and develop interdisciplinary projects (35.98%),
- consuming time to design, support, and report which cause delaying their schedule,
- overload work for implementing PBL (31.75%),
- insufficient attention, institutional support, and cooperation from the university units (30.16%),
- lack of training on PBL (64.80%),
- and absence of Guidelines or Policy & procedures for PBL (40.82%).

### *4.3 PBL and Industry's Stand*

The average responses of the industry representative towards PBL benefits ranged between 1.70 and 2.02 with SD between 0.77 and 0.86. The following benefits have been identified:

- getting fresh external eyes on the company processes;
- obtain valuable results and information from the final project results,
- accessing unbiased "out-of-the-box" thinking models,
- engaging in a dynamic dialogue with faculty and students out of company's established patterns which usually ends up with revealing unexpected ideas or outcomes,
- getting job-ready skilled graduates and minimize the mismatch between academia and industry.

Particular benefits were highlighted by small industries, such as access to university facilities and expertise and reaching the reflections of latest researches and consultancy, the mean ranged between 1.67 and 2.13 (Disagree) with SD between 0.75-0.84.

The most critical challenge hinders industry's' support to PBL is the unwillingness to release the operational and that received 55% of the companies' responses. Other challenges are as follows:

- project time frame lacks flexibility due to the rigid academic calendar (53.85%),
- extensive collaboration demanding significant amounts of time (38.46%),
- lack of industry clarity towards desired outcome and actual need (38.46%),
- limited manpower resources to facilitate interactions in PBL (25.00%),
- high expectations that could go beyond the educational practice and capabilities (23.08%),
- and mismatch between company interest and project theme (17.31%).

Regarding policy for collaboration with Universities, 47.17% of industries do not have such policy.

**Conclusion**

The research examined the dynamic framework for effective PBL. The results revealed the lack of clarity in concept and benefits of PBL as a teaching & learning strategy for the stakeholders, given the challenges faced by student, faculty, and industry. There is a crucial need to support the universities' convictions about the importance of implementing PBL to develop 21st Century job market skills. Higher Education Authority Bodies, various Ministries such as Labor, Industry and Trade Ministries should integrate their efforts to encourage industry sectors to cooperate with universities in carrying out projects and applied research. Parallelly, Universities should develop and implement effective PBL mechanism that guides both faculty and students while conducting projects with industry. Appropriate training, workload management and evidence-based evaluation should be deployed to sustain and ensure beneficial PBL with industry.

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# Research-Based Learning in Digital Teams

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## Abstract

*The developmental research project presented in this paper pursues the goal of enabling students to learn basic research methodology in digital teams and eventually to become active in research themselves. For this purpose, we will implement the concept of Research-Based Learning in digital teams using a peer-review-based AI-online tool. We resort to a software that was recently developed in a joint project involving three German universities funded by the Federal Ministry of Education and Research (BMBF) and which we would like to implement in an educational module for the first time. We work closely together with the developers of the software and connect conceptually to the current scientific discourse.*

*Keywords: artificial intelligence, research-based learning, knowledge creation*

## 1. Introduction

The competence to create new knowledge is vital for both researchers and academic staff members within the university. This academic key qualification will continue to gain importance in other domains in the context of shorter innovation cycles, digital transformation and agile, self-directed forms of work. Hence, introducing students to scientific work is an essential task of post-secondary teaching. However, due to large numbers of participants and limited resources, many university teachers have resorted to a mixture of classic lectures, teamwork on individual topics during course hours and examinations in the form of individual written papers on individual aspects of scientific work. These conditions are prevailing in many universities and they give rise to three challenges, which we would like to address in the context of a developmental project:

- suboptimal teaching formats and insufficient feedback to students due to high numbers of participants,
- educational potential of a change of perspective between the role of researcher and reviewer remains unused,
- self-organized or random formation of teams are not optimal for the learning process.

The challenges presented here in short do not only arise within the framework of our module, but are typical of all events in which students are to learn scientific work.

## 2. Objectives

We aim at fostering exploratory learning in digital teams and consequently at guiding participants during the initial study phase of their subject area. Three objectives are to be realised as follows:

### 2.1 Implementation of Research-Based Learning on the basis of peer-review procedures within an introductory module in the field of Economics

We build our educational development upon a heuristic model for teachers who want to take on the concept of Research-Based Learning in their teaching. This model has been developed within the framework of a project involving three German universities funded by the Federal Ministry of Education and Research (BMBF) [1].

Based on the work of Brew [2], the so-called "FideS dual-wheel model" identifies factors teachers need to consider when developing a research-based learning module.

It implies that teachers' decisions should be based on learning outcomes combined with pedagogical, institutional, research- and disciplinary perspectives: Brew's model integrates decisions about the curriculum context including the nature, number and type of students, learning outcomes including disciplinary knowledge acquisition and attributes capabilities and skills to be developed as well as the nature of knowledge and the nature of the tasks to be completed and how they are to be assessed [2, p. 613].

The FideS model builds upon this approach. It emphasises the extent of student autonomy in developing research capability [1, p. 128]. As shown in Fig. 1, the FideS-authors distinguish between a micro and a meso level. At the micro level, an extent of autonomy is chosen for each aspect of the Research-Based Learning methodology (e.g., research topic, research question, planning, implementation, presentation of results, reflection, and feedback). The meso-level reflects the teaching staff's leeway as defined by the programme curriculum (curricular integration, number of credit points, modular responsibility, resource framework, time frame, and examination framework). The double-wheel model illustrates that decisions at one level affect the other and facilitate or restrict options for educational decisions [1].
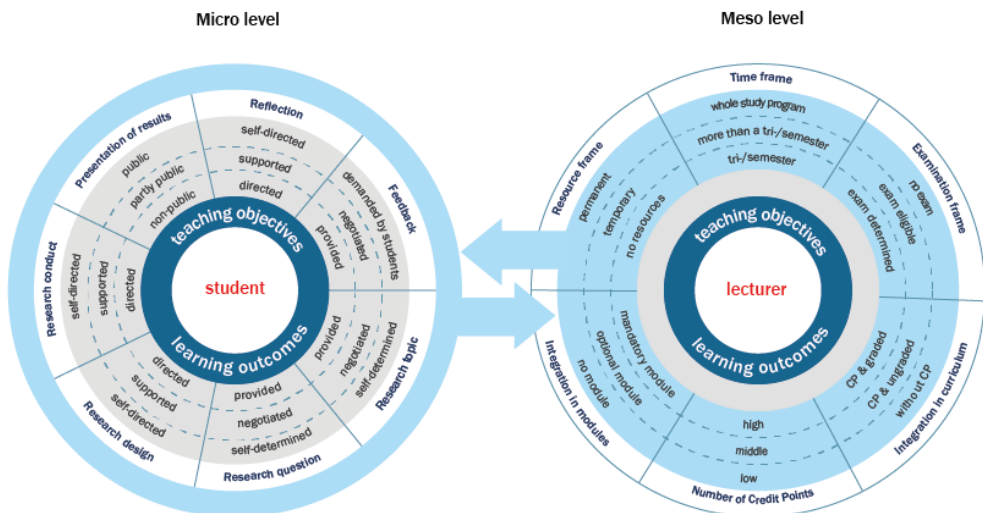


*Fig. 1. Analysis and conception of research-based learning – the FideS dual wheel model by [1]*[1]

On the basis of this heuristic model, we will further develop an introductory module on research and scientific writing in the field of economics: We address a compulsory module with 6 ECTS points and an average of 70 participants, which is part of a

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[1] Retrieved from http://forschendeslernen.com/fides/indexeng.html

Bachelor's degree course in Business Administration in the Department of Business Administration and Economics at OWL University. Our redesign aims to enable students to learn by conducting typical parts of economic research: For this purpose, two major adaptations have to be carried out:

- Students should work in teams rather than individually to prepare an extended abstract for a research project within the framework of the module.
- The degrees of freedom are to be defined, e.g., with regard to the choice of topic and the research methodology.

Reflection and feedback processes are crucial in Research-Based Learning. We use peer assessments to guide students towards reflective learning [3, 4]. Students take on the role of critically reviewing the work of their fellow students and giving each other feedback Students should support each other while planning and implementing their research projects. To this end, we will establish mutual reflection exercises and feedbacks. Evaluation criteria for economic research and scientific writing will be edited for learning and peer review purposes.

Peer reviews are expected to improve learning outcomes in three ways. First, they complement feedback provided by the lecturer and thereby enrich learning for the recipient. Secondly, peer reviews are expected to help the reviewers with regard to their own research projects. By switching the perspective from author to reviewer, students gain a more profound understanding of scientific writing. Finally, peer reviews promote exchange, cooperation and networking among the students – they form a "community of practice" [5, p. 652 f.]. Ideally, grading is partially based on peer reviews (provided the examination law allows for this).

### 2.2 Implementation and testing of an innovative software tool with peer-review functionality to support exploratory learning in digital teams

Digital technologies have the potential to promote self-organised and cooperative learning. In portfolio and content management systems, reusable learning materials like *wikis*, *blogs*, *podcasts* or *video portals* can be made available for receptive learning.

Furthermore, digital learning environments can promote reflexive learning [6]. Thus, the implementation and coordination of peer assessments is considerably simplified due to the digital availability of learning outcomes. Furthermore, digital platforms facilitate collaborative work on joint projects and asynchronous communication in teams [7]. Yet, tools for digital peer reviews are rarely implemented in learning platforms.

Supporting software for Research-Based Learning has already been developed by the FideS team (see section 2.1). The software addresses three challenges that teachers face in Research-Based Learning: 1) to give or to organize feedback on research questions/problems, 2) to form more productive student teams based on individual research and learning interests, and 3) (peer) reviewing the joint results. We seek to implement this tool to facilitate teamwork and peer reviews in large-scale learning environments.

### 2.3 Establishment of an online pool of teaching materials for scientific work

We will support our students throughout the research process by providing learning materials for scientific work. Complementary, students will be provided with informative and inspiring contributions in the form of wikis, blogs, podcasts and videos on a collaborative OER platform (Open Educational Resources). Primarily, we will re-use media already produced here (e.g., tutorials on literature management issues, podcasts on how to find a suitable research topic, or TedTalks on an appealing presentation of results). All media will be embedded in the module plan (with guiding questions,

explanations, cross-references or assessments) so that students can use these items for online-supported self-study. In addition, subject-specific examples [8] will be prepared – i.e., outstanding or particularly vivid examples of good economic research or good reviews. Students can use these examples for inspiration and they will provide orientation in the context of learning through research.

## 3. Measures of Success and Transfer Opportunities

We will consider this project successful if we succeed in:
- developing a sound educational concept together with a detailed plan for the implementation of Research-Based Learning using the FideS software in the Department of Business Administration and Economics at OWL University,
- carrying out a pilot course until summer term 2022, evaluate it and prepare it for the winter term 2022/23 in such a way that it can be consolidated and transferred to other teaching areas.

Our module could serve as a case study for other compulsory subjects in a wide range of disciplines. Since the research process is similar in most social science disciplines, the concept of learning by doing research in digital teams can be applied to many degree programs. The FideS research team deliberately pursues the goal of developing a tool that can be applied across disciplines. Their open source software will be freely available via GitHub (https://github.com/) and can thus potentially be used by all universities for the implementation of software-supported Research-Based Learning.

We will make our online pool of learning materials for scientific work (wikis, blogs, podcasts, videos etc.) also freely available as a collection of Open Educational Resources (OER). University lecturers and students from all disciplines cannot only use this offer freely, but also add additional content.

## 4. Risks and Limitations

One major risk is the introduction of Learning through Research as an educational approach that is new to the subject area. For both teachers and students this means a change in their previous teaching and learning habits. We therefore plan to actively collect feedback from students and teachers both before the introduction and during the pilot semester within the framework of Teaching Analysis Polls (TAP). Besides, we will involve them in the educational development process. Finally, the summative evaluation of the course carried out towards the end of the pilot semester offers the opportunity to compare the overall result with the results of previous runs of the course.

A further risk of this project is the comparatively high technical requirements for implementing the FideS tool in the IT infrastructure of OWL University. In order to minimize the risks associated with the technical integration, the adaptation and use of the software will be carried out in close cooperation with the FideS project team and especially with the software developers.

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# Curriculum Development

# Content (Linguistic) Knowledge in Language Learning in High School

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## Abstract

*The present paper intends to show that it is reasonable to include certain part of modern knowledge about language (linguistic knowledge) in language learning in high school, to offer instruments of presenting them, and to outline the spectrum of their effectiveness. Communication and cognition are considered as two mutually complementing and reinforcing fragments of developing holistic speech competence among students and including content (linguistic) knowledge in language learning as a means to develop mental skills. The present paper proposes to include some concepts of modern linguistics in the process of language learning in order to develop coherent communication – first and foremost, writing – skills among students: the structural pattern of the sentence, the argument structure of the sentence, syntactic valence, semantic case, etc.*

*Keywords: cognition, integrated curricula, language learning, content knowledge, functional grammar*

Over the last half-century, the communicative principle has become the main principle of language learning (LL). First and foremost, this applies to learning non-native languages, which are normally called foreign languages (FLL). Expanding the limits of interpersonal and intercultural communication while learning those languages has become – without doubt – a motivational priority. As a result, involvement of a substantial linguistic component as such in FLL has been side-lined, to say the least. Furthermore, that expansion of the "repertoire" of languages boils down to learning more-and-more limited number of languages-intermediaries, and that the number of those languages is in danger of eventually accounting to one. For the time being, English seems to be the irreplaceable "guarantor of communication." Let us put aside political and geopolitical aspects of that trend toward language uniformity, especially given the fact that politically, the language policy of the European Union, in particular, leans toward language diversity – "importance of language competences and language diversity in the changing international environment". [1] In this paper, I will show that it is reasonable to include knowledge about language (linguistic knowledge) in language learning in high school. I posit that part of that knowledge should be included in the curriculum, showing the instruments of presenting them and the spectrum of their effectiveness. That may weaken as it were the principle of communicativeness but only insofar as its aspirations toward absolute dominance in LL or even FLL are concerned – in a nutshell, it is about two mutually complementing and reinforcing fragments of developing holistic speech competence among students – communicative and cognitive.

LL in high school is part of the curriculum, an academic discipline, and as such it must have the goal of developing not just competences in individual disciplines, but also overall competences of a person, developing cognitive competences of the highest

degree in particular – skills of analysing and evaluating text statements (cognitive skills together with passive forms of speech, such as reading and listening) and skills of constructing a substantiated oral or written text (cognitive skills together with active forms of speech, such as writing and speaking). It is obvious that the teaching potential of such a discipline is much bigger than serving communicative needs, and the expansion occurs thanks to involving a large spectrum of cognitive skills in the teaching goals and results.

In the context of educational objectives of the 21st century, when not only is communication perceived differently, but also objectives are modified while drawing up the curriculum, its full use is at the very core of the educational agenda. Thus, I think it is of utmost importance to turn to the communication dimension and its sub-dimensions.

The first sub-dimension is effective communication, which includes not just using the correct language, but also having an impressive set of emotional and cognitive skills necessary to analyse the information/text and "to achieve an effective communication." [2]

It is complemented by the CDC-model requirements for the curriculum "that sets out the values, attitudes, skills, and knowledge and critical understanding." [3]

None of the natural or artificial systems can imitate human thinking, his logical and cognitive categories as completely and coherently as language can. Those categories exist in the grammar of the language and its linguistic description. Does it mean that we have to return to boning up on grammar "school style," the roots of which reach back virtually to antiquity and which is conserved in many ways up until now in native language learning? No, because, inter alia, this kind of linguistic/grammatical approach contradicts the communicative principle: that very contradiction was the reason why it was rejected by modern FLL.

The new "coming" of linguistics in high school should be at the converging point of modern linguistic approaches (linguistics as a cognitive science) and goals of modern education – to develop skills necessary for a 21st-century man. However, before moving on to the practical proposals regarding these two scientific paradigms – linguistic and educational – I deem it appropriate to briefly focus on terms *content (linguistic) knowledge* and *language learning*, which are mentioned in the title of this paper.

The notion of content knowledge derives from the amalgam "pedagogical content knowledge" (PCK), which was introduced to the active pedagogical discourse by Lee S. Shulman and was supposed "to merge" subject matter with pedagogical competences. [4] Later on, technological knowledge was added to this educational paradigm to suit the educational paradigm of the 21st century, and the new three-layer amalgam PTCK [5] was comprised of two double-layer sub-amalgams pedagogical content knowledge (PCK) and technological content knowledge (TCK). However, here too "PCK covers the core business of teaching, learning, curriculum, assessment, and pedagogy." [6] In other words, (P)CK is the knowledge that the future language teacher must obtain during his professional training at the university as results of his theoretical courses on applied and general linguistics. It is the linguistic education that he will have to apply to his students' language learning. Consequently, one should clearly differentiate between language learning and linguistic education, "which, by the way, is reflected in having special educational plans for the Linguistics specialty. Is it justified? I believe yes, because such specialties make it possible to plan and fulfil practical tasks, along with planning the very theoretical issues of linguistics." [7] For successful practice, the teacher will certainly need the other two components of the above-mentioned amalgam as well and. in addition to that, competences in ESD (Education for Sustainable Development): systems thinking, values and ethics, emotions, actions [8]. Thus, another important problem arises – to change professional training programs for future language teachers, but that is beyond the scope of this paper.

The above-mentioned conceptual approach underlies the integrated language course of the Russian language whose linguistic component itself was combined with improving all 4 forms of speech on the one hand, and developing cognitive competences on the other. We have chosen coherent communication – first and foremost, writing – as the area of application for integrative learning potential of language teaching, i.e., complex development of communication skills. It should be added that Ayb High School students' first (native) language is Armenian, but they also have English proficiency at the level not lower than B2 according to CEFR and Russian proficiency – at least, those groups that study according to the approbated program – at the level close to TRFL2 (equal to B2 in CEFR), sometimes even higher.

Having writing skills and their application is not only one of the requirements of CEFR, but also a complex requirement of the educational curriculum as such, in other words, it spreads "across the board." [9] In this regard, on the one hand, it in a way belittles the significance of disciplines, directly linked to gaining communication skills (literature, languages, analytical writing, etc.), as they share the "responsibility" for developing speech competences with other subjects that do not directly aim at that. On the other, aiming to fulfil this task, which is one of the most important, penetrating tasks, learning first (native) language and non-native (foreign) languages come under the same "umbrella." I hope – referring, first and foremost, to teaching the Russian language – that some insights of comparative nature and recommendations of methodological nature will be useful in teaching other languages as well.

The course of the Russian language at Ayb is based on functional grammar, which, given its potential to activate communication, is often called communicative and/or active too. [10] Its use in Russian academic handbooks and, accordingly, in teaching languages has a 20-year history. Nonetheless, there are two very substantial "buts" here. First, those handbooks are almost exceptionally for teaching Russian as a foreign language (TRFL) and, what is more, at the level not higher than TRFL2 or for teaching the language-for-specific-purposes (LSP). Second, those handbooks are intended for developing grammar skills and, despite being founded on syntax, they use morphological commentaries characteristic of traditional linear grammar. In the handbooks for developing reading and writing skills, the functional-grammatical approach is basically not used, and they – those skills – as mentioned above, are the very focus of our attention. To be more precise, we tried not just to show the means of expressing subject-predicate, modificative, and agent-object relationships/meanings in the Russian language, but also "to include" the comprehension of that whole toolkit in the process of comprehending written text (reading) and to employ that toolkit in producing coherent communication – first and foremost, writing. It is obvious that one should take into account the Ayb students' "language repertoire" and the configuration of languages that they are proficient in and use both the positive and the negative interlanguage transfer of speech knowledge and skills, the so-called interlanguage interference. Referring to that very circumstance, below I will focus on 3 concrete subjects that linguistic knowledge, traditionally left out of the school program, helped students apprehend:

I.     Culture-specific problems related to perceiving different situations imposed as it were from the outside and using personal pronouns, especially the pronoun "I" [11] as the subject of a sentence in the Russian language have led to the domination of sentences with a semantic/indirect subject. The grammatical core of such constructions in the Russian language is simple sentences with the subject in the dative case and, accordingly, without coordination between the subject and the predicate. This specificity of the Russian syntax is not present in either English or Armenian syntax. What is more, those constructions when used by an Armenian speaker are construed as influenced by the Russian

language. In order to ensure adequate comprehension of those constructions and to stimulate their correct usage in speech, it is more appropriate to structure those sentences in the Russian language with the following formula $S_{N/PronDat}$ + $Pred_{Vfin,pres/fut\_3sing}$ or $Pred_{Vfin, past, neutr.}$ A natural question arises whether this schematic representation is more preferable than the traditional descriptive definition. From my perspective, it has at least two undeniable advantages: 1) thinking that formula over helps students digest it; 2) being in a sense a mind map, it organizes their thinking.

II.   Another concept of modern linguistics that is worth including in the school knowledge is the theory of a sentence's argument structure and its syntactic valence introduced by Lucien Tesnière with the addition of Charles J. Fillmore's semantic classification of cases. In the context of our course in particular, it helps better understand how the means of expressing syntactic relations – commonly called agent-object relations – are represented. By the way, in this case as opposed to the above-mentioned, it is not just more plausible, but more reasonable to teach in comparison, even considering the internal specificities of particular grammatical representation of verb-phrase syntagma in other languages (for example, exceptionally prepositional heads in the English). The educational advantage of this approach is that it lets you overcome controversies and certain limitations of the traditional syntactic description, to bring the study of these semantic relations into correspondence with the logic of thinking, to take language learning to a level of interlanguage comparison and to cultivate mental skills of a higher degree – skills of analysis and generalization – in students.

III.  In terms of directly affecting the ability to improve writing skills, the ideas of transformational grammar cannot be overestimated. In general, they are in the very foundation of functional grammar, which brings together means of expressing concrete meanings and outlines the consistencies of their interchangeableness. However, the application of this idea in language learning should not be confined to its use in practice. It should be apprehended by students at the semiotic level as a universal trait of a linguistic sign, as its ability of syntagmatic variation. This is the very thing that will make their writing not just more diverse, but more clear, precise, and, more importantly, argumentative as well.

The above list of examples, which can be extended, shows once again that no one is talking about opposing the communicative and cognitive principles in language learning.

The main idea here is to expand cognitive abilities of language learning, which persistently demands employing additional content (linguistic) knowledge in the educational process.

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# From Learners to Educators
# Development of Online Courses by Students for Students

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## Abstract

*The rapid growth of technology and its evolving potential to support the transformation of teaching and learning in post-secondary institutions is a major challenge to the basic understanding of both the university and the communities it serves. In higher education, the standard forms of learning and teaching are increasingly being challenged and a more comprehensive process of differentiation is taking place. Student-centered teaching methods are becoming increasingly important in course design and the role of the lecturer is changing from the knowledge mediator to moderator and learning companion. However, this is accelerating the need for strategically planned faculty support and a reassessment of the role of teaching and learning. Even though the benefits of experience-based learning approaches for the development of life skills are well known, most knowledge transfer is still realized through lectures in higher education. Teachers have the goal to design the curriculum, new assignments, and share insights into evolving pedagogy. Student engagement could be the most important factor in the learning success of university students, regardless of the university program or teaching format. Against this background, this article presents the development, application, and initial findings of an innovative learning concept. In this concept, students are allowed to deal with a scientific topic, but instead of a presentation and a written elaboration, their examination consists of developing an online course in terms of content, didactics, and concept to implement it in a learning environment, which is state of the art. The online courses include both self-created teaching material and interactive tasks. The courses are created to be available to other students as learning material after a review process and are thus incorporated into the curriculum.*

*Keywords: future curriculum, digitalization, online courses, COVID-19*

## 1. Introduction

Against the background of digitization and for decades, new educational technologies have been in development, and the need for new pedagogical concepts and teaching methods has been discussed. However, they remain rather isolated, individually driven closed solutions, and have not yet had the promised transformative effect on the education sector, as they did not become necessary until now. During the 2020 COVID-19 crisis, the need became a reality overnight. Universities all over the world were placed in a situation that made offline teaching impossible. Besides all the negative effects that the COVID-19 crisis has brought with, it can also be seen as an opportunity to recognize one's limits in terms of digital education and to gain experience.

This paper aims to present an innovative learning method for universities, which plays a special role in the context of digitization: By developing online learning courses as a learning output, students are involved in the creation and delivery of teaching content, which can lead to curriculum change. At the same time, the application of the new learning method leads to students acquiring the necessary skills of the future and thus being prepared for living and working in a digital world.

The current COVID-19 crisis has shown how important such competencies are, so the paper aims to show how students can become part of the education at the university.

The development of the courses via Moodle is a free, interactive, and easy to be applied. With the plugin H5P [1], that can be used as a plugin since 2016, students can choose of 20 different interactive learning formats (educational videos, interactive presentations, knowledge retrieval using flashcards, etc.) and to motivate them to actively participate, as in the case described here.

In this paper, the current developments and challenges of university education are briefly described, followed by a presentation of the framework for the application of methods, the concept of creating online learning courses, and the evaluation criteria for a structured review process. In conclusion, the paper provides an overview of the challenges and next steps.

## 2. The Current Challenges of Higher Education

In higher education, teaching does not only concern the objective of conveying and assessing specific learning content. Rather, students should also be prepared for their professional future by acquiring a wide range of competences – subject-related (representing knowledge and know-how in a specific field), behavioural and social competences and other so-called future competences, such as the four Cs: communication, cooperation, critical thinking, and creativity, which are part of the general objectives at the global level (e.g., [2]). From the perspective of students' future employers, skills such as developing new concepts and ideas and the willingness to present one's ideas and challenge the ideas of others, as well as attention to opportunities, coordination of activities, acquisition of new knowledge and media literacy were identified as the most important ones, not only in the context of innovation [3].

Digitalization is an accelerator of demand for these skills and a more comprehensive process of differentiation is taking place in higher education, where the standard forms of learning and teaching are increasingly being challenged. This leads to a shift from instructive learning, e.g., in the form of lectures, to experiential learning in which students take an active role in the learning process and teachers act more as learning facilitators and instructors. Even though the benefits of experience-based learning approaches for the development of life skills are well known, most knowledge transfer is still realized through lectures in higher education [4].

## 3. Framework and Goals of the Innovative Teaching Concept

Against this background, this paper presents an innovative teaching concept, which has been introduced and tested in Germany. Students deal with a scientific topic, but instead of a presentation and a written elaboration at the end of the semester, their exams consist of developing an online course in terms of content, didactics, and concept and realize it in the learning platform Moodle. The online courses include both self-created teaching material and interactive quizzes. Students are placed at the center of knowledge transfer. This allows them to show how a topic should be prepared and conveyed. Besides, students also get to know the limits of online courses and learn to

critically reflect on how their broad knowledge on the topic, that was collected during the semester could be best summarized and transmitted. In doing so, the students have to particularly reflect on their knowledge to be able to pass it on in the form of an online course. Furthermore, students develop new necessary digital and learning skills. On the one hand, during the preparation phase, they deal with the selected scientific topic in great depth and learn not only to understand the content, but also to convey it in a focused and expert manner. Students deal with didactic concepts and learn through a practical application on how to handle a digital learning medium. Also, they receive feedback from other students and have the opportunity to use it for a reflection of their work.
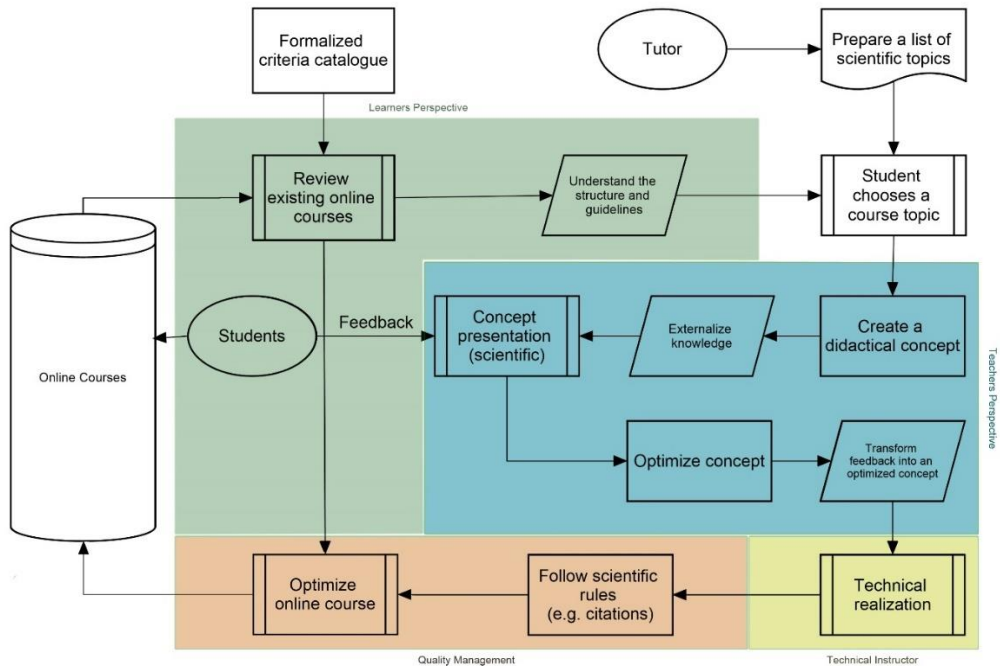


*Fig. 1. Framework for creating online courses by students in a seminar*

## 4. Concept to Create Online Courses in a Seminar

Before starting to create a new online course, students have to participate in several already existing courses (at least two) to evaluate them. Therefore, a general guideline was prepared that includes context-based and technical-based restrictions, and recommendations, including notes to consider copyright issues. In that step, they participate in existing courses from the student's perspective to learn critical thinking and how to give constructive feedback. Besides, they get in touch with the guidelines that also have to be followed by them. Detailed notes about the evaluation criteria can be found in the next section.

The tutor of the seminar prepares a list of scientific topics, similar to a usual seminar where students have to write a seminar paper. Students can choose one topic or propose their own. Then students change their perspective, from the students one to a teacher's perspective. In that step, students have to think about how to pre-process the knowledge and how to externalize it to teach the topic. This step is comparable with the preparation of a lecture in class. At the same time, students must be aware of a few limitations that

occur due to missing face-to-face communication in an online environment. They have to choose an appropriate didactical concept that works best to teach their topic to students. This concept has to be shown in a local 15min presentation to get feedback from other students, that evaluated other already existing courses before as well. In that presentation, students have to follow classic scientific rules to present scientific contents that are state of the art including giving references. After getting feedback, students can optimize their concept. Then they change their perspective again to a technical instructor. In that step, students have to create their new online courses on the platform.

There they have to deal with technical limitations but also use opportunities in creating interactive tasks. Students learn how to transfer their concepts to a technical environment. This is what they do not learn in their curriculum in general. In this seminar, the learn it by doing.

After the creation of the online course, students have to check whether all scientific rules are followed (e.g., citations) according to the guidelines. Similar to a seminar paper, created online courses should not contain any plagiarism and the validity of taught knowledge has to be proven by giving references. This is important to obtain valid online courses and to meet high-quality standards. The created course will be reviewed by other students afterward and the student (or others) can optimize the online course again.

## 5. Evaluation Criteria of the Review Process

In the review process, students have to evaluate online courses on different layers according to the evaluation criteria. This includes different objective metrics (details can be found in Table 1). The review process is an important step to get online courses at high-quality. Online courses that reach a high score will be published later. As students can use their online course as their reference in the future, this is a motivation to be allowed to publish it. Otherwise, it remains hidden.

| Objective metrics | Description |
|---|---|
| Novelty of the overall course | Is the course new or is the topic already taught a lot in online courses? |
| Completeness | Does the online course include all necessary parts like the introduction, knowledge requirements, a final summary, references, and related material? Does a section have at least 2 items? |
| Technical implementation | Are there display errors? Are videos embedded properly [not just links]? |
| Scalability | Can tasks be corrected automatically and do not necessarily need to be corrected by a tutor? |
| Copyright rules followed? | The idea is to publish online courses. Therefore, the use of own media or media under a creative common license (CC) is necessary. |
| Course duration | 15 min, not more, not less |

| Didactical metrics | Description |
| --- | --- |
| Media-Mix | Are different methodologies used to teach and test knowledge? A broad variety of concepts, not only multiple-choice questions should be used. |
| Feedback | Do interactive tasks give feedback on correct and incorrect answers? |
| Visualization methods | Does used images support in understanding the contents? |
| Different Difficulty Levels | Are different difficulty levels in interactive tasks and the final test according to Bloom's Taxonomy [5] are used? Tasks should not be too easy and not too difficult. |

| Context metrics | Description |
| --- | --- |
| Correctness of contents | All information should be correct with given references. |
| Correctness of the course title | The title should not be a "fancy" teaser, it should be descriptive enough to describe what the course is about. |
| Selection of examples | Is the example selection good? Are there other examples that support the understanding in a better way? |
| Appropriateness of contents | Is the content appropriate for the target group (e.g., students at university)? |
| Independency of sections | Is the course structured, are sections independent, or should they be merged? |

*Table 1. Evaluation criteria for online courses*

## 5. Conclusion

The application of the method and the creation of online courses open up a new opportunity for students to critically reflect on processes of knowledge transfer in the digital society and to get to know their chances and limits. Also, a change of perspective takes place, which contributes to a better understanding of the teaching process and the challenges facing teachers. The innovative concept presented opens up many opportunities for research on the topic of digitization of teaching at universities. There is also the potential for a transfer to the academic community and for initiating new research and application-oriented projects in the context of digital education and Learning Analytics.

During the first experiences, some aspects have emerged as points of discussion.

The question arises whether the versatile possibilities that H5P offers students are not only positive but also overwhelming. Additionally, some students do not have such well-developed digital skills. Besides, we are currently reviewing whether the metrics and criteria for the review process are sufficient and whether subjective characteristics of the reviewers, emotional aspects, previous knowledge, experience, etc. also need to be taken into account. Concerning the application of the method, a dependency on the institutional framework, culture and framework conditions, especially for the evaluation and grading at the university must be taken into account.

Two characteristics of the created courses are particularly positive – on the one hand, the possibility to not only create texts and videos and to query content (which is common in online courses), but also to create interactive elements instead of creating multiple-choice tests only. Their application stimulates other senses and increases the learning effect. On the other hand, certain cultural barriers are reduced because students receive learning content that has been prepared by their subgroup.

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# Inter-Curricular Cybersecurity ABET Assessment Perspectives

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## Abstract

*The field of cybersecurity has been rapidly developing over the past few years primarily from the quickly changing legal requirements for maintaining privacy and security of assets and their internal sensitive data. To address the changes within the computing field, the Accreditation Board for Engineering (ABET) proposed preliminary cybersecurity accreditation criteria a few years ago. After ABET introduced the preliminary criteria, less than 10 universities have both applied and become ABET Cybersecurity accredited.*
*This research explores ABET Cybersecurity Assessment perspectives from multiple courses in the Bachelor of Science program at St. John's University in Queens, New York. Specifically, this research first examines current published trends on ABET accreditation. We, then, examine how different ABET assessment criteria are assessed with respect to three core cybersecurity courses in our program: Network Security, Digital Forensics, and Secure Software Development. These courses were chosen as they introduce three different perspectives of cybersecurity: development, risk management, and forensics. Interestingly, the inter-curricular courses are all inter-related and share assessment topics. Our research explores how the courses share fundamental assessment topics; but each has stronger relationships to a different perspective within the field. Finally, the paper concludes with both lessons learned, from the ABET assessments, and prospective future cybersecurity assessment research topics.*

*Keywords: Accreditation Board for Engineering, ABET, Assessment, Network Security, Secure Software Development, Digital Forensics, Undergraduate Program, New York State*

## 1. Introduction

Cybersecurity has become fundamental to all information networks and systems. One of the recent drivers for the importance of cybersecurity are regulations and the protection of factors which go into risk assessments such as reputation, life protection, among other concerns. To keep pace with the changing cybersecurity industry needs and research, academic institutions have been developing and expanding curricula to both address the real-world changes and to prepare students for entry into the international workforce.

## 2. Review of Literature

Undergraduate programs are normally accredited by a governing body that oversees the curriculum and resulting data of programs within institutions. Given the popularity of many engineering, computing and more recently cybersecurity programs, specialized accreditations are highly sought after to strengthen the program simultaneously creating a competitive advantage over programs that are not specifically accredited with top

accreditors such as the Accreditation Board for Engineering and Technology (ABET) that focuses on specific outcomes to see if a program has met fundamental and foundational goals necessary for the program to be successful and for graduates to succeed [2, 7, 8].

### 2.1 ABET Accreditation

ABET created an accreditation criterion for cybersecurity programs that would offer flexibility to the institution as well as extensive guidance by the CSEC 2017 and expert input. In its first year of accreditation, only a small group of selected cybersecurity programs were accredited as pilots [9].

If a program is accredited, it is periodically renewed as long as it is maintaining its educational quality standards. Because the accreditation is highly sought after and highly valued in academia, the process is very time consuming and often rigorous.

Many of the ABET criteria that were finalized as part of its standards were guidelines that were created based on recommendations from key and prominent figures in computer science, engineering and technology who served as members of the ACM, SIGCSE and other prominent organizations [11]. With help from professional organizations such as the Computing Sciences Accreditation Board (CSAB), IEEE Computer Society and the Association of Computing Machinery (ACM), ABET's criteria for the cybersecurity curriculum was developed and this will help to maintain that each program that receives accreditation will continue to develop and meet continuous improvement measures based on assessment that is provided to its constituents which include students, family, academic institutions, government agencies and the public community [6].

Because of its popularity, both within the US and internationally, many universities and colleges are offering more courses and programs designed to meet the needs of careers that are geared towards qualified cybersecurity professionals. The cybersecurity programs that are accredited by ABET will be complimentary to programs that already are part of the ABET accreditation such as computer science, information technology and information systems [5].

### 2.2 Assessment

A few papers have discussed ABET assessment criteria. Nitta and Eiselt [3] discussed an assessment where the questions mapped to the 2019 ABET Computing Accreditation Commission (CAC) Student Outcomes (SO). Sanderson [4] discussed computer science ABET assessment criteria in the early 2000s. There are limited, if any papers, on the new ABET cybersecurity accreditation assessment criteria.

## 3. Cybersecurity and Digital Forensics Curriculum

As the St. John's University website states, students who graduate with a BS in Cybersecurity from St. John's University at the Collins College of Professional Studies, will attain meaningful positions toward successful careers in cybersecurity or a related field, will advance their professional development through self-directed learning and or graduate study, will practice cybersecurity professionally and with specific regard to ethical and societal responsibilities. Additionally, it is noted that students who major in cybersecurity at St. John's University will be able to analyse a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions; design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline; communicate effectively in a variety of professional contexts; recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical

principles; function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline; and apply security principles and practices to maintain operations in the presence of risks and threats [1].

A sample 4 year cybersecurity major plan consisting of 120 credits [1] is as follows, (available here).

**Year 1**

| Fall Semester (15 credits) | Spring Semester (15 credits) |
|---|---|
| Foreign language elective | CUS1116 Programming Fundamentals II |
| CUS1115 Programming Fundamentals 1 | Foreign language elective |
| DNY1000C Discover NY | ENG1100C Literature in a Global Context |
| MTH1009 Calculus I | MTH1022 Discrete Mathematics |
| FYW1000C First Year Writing | CSS1005 Fundamentals of Cyber Security |

**Year 2**

| Fall Semester (15 credits) | Spring Semester (15 credits) |
|---|---|
| CUS1126 Introduction to Data Structures | CUS1165 Database Management Systems |
| SCI1000C Scientific Inquiry | NET1011 Introduction to Networks |
| CSS1006 Management of Information Security | HIS1000C Emergence of a Global Society |
| MTH1013 Probability & Statistics I | MTH1014 Probability and Statistics II |
| PHI1000C Philosophy of the Human Person | THE1000C Perspectives on Christianity |

**Year 3**

| Fall Semester (15 credits) | Spring Semester (15 credits) |
|---|---|
| CSS1021 Cyberlaw and Ethics | NET1015 Routers and Router Concepts |
| DFR1001 Intro to Digital Forensics | CSS1011 Network Security |
| Free elective | Free elective |
| ECO1001 Principles of Economics I | ECO1002 Principles of Economics II |
| THE1040 Moral Theology | PHI1020 Ethics |

**Year 4**

| Fall Semester (15 credits) | Spring Semester (15 credits) |
|---|---|
| PHI3000C Metaphysics | CSS elective* |
| CSS1032 Cyber Threats and Detection | SPE1000C Public Speaking for College Students |
| CSS1035 Secure Software | THE any elective |
| CSS elective* | Free elective |
| Free elective | Free elective |

## 4. Curriculum Assessments

Our university chose six main Student Outcomes (SOs). Our SOs involve the following topics: (1) compute complex problems, (2) design, implement, and evaluate solutions, (3) communicate effectively, (4) recognize professional responsibilities, (5) functional effectively in a team, and (6) apply security principles and practices. This paper focuses on the shared and unique assessments across the three following courses: Introduction to Digital Forensics, Network Security, and Secure Software Development.

### 4.1 Shared Relationships between Courses

Digital Forensics, Network Security and Secure Software Development share commonalities in that students need to be able to function effectively in a team and recognize professional responsibilities in all of these subfields. Furthermore, from a cybersecurity perspective, both Digital Forensics and Network Security need to share SOs for communication. Lastly, all the courses need students to be able to apply security principles and best practices.

Network security and Secure Software Development share some relationships especially when it comes to designing, implementing and evaluating solutions. The actual software development and deployment of network security risk mitigation techniques are closely related at the undergraduate perspective. As Digital Forensics is currently a specialization within our Cyber Secure System degree, we are not yet focusing undergraduate study on the development of new digital forensics tools.

### 4.2 Unique Relationships among Courses

We found that Digital Forensics needed to be the focus of our assessment for students being able to compute complex problems. Digital Forensics typically involves cyber-investigations, which in many cases involve complex malware or breach problems.

From a cyber secure system perspective, many large and complex problems involve data mining, which is traditionally an entirely separate course.

## 5. Lessons Learned and Future Research

We have learned a great deal from undertaking the ABET cybersecurity accreditation. Furthermore, there are many future research topics which have evolved out of accreditation and assessments.

### 5.1 Lessons Learned

We have learned many lessons from undertaking the ABET cybersecurity accreditation and assessment development. First, the division must support the process and the dean must also offer the support in order to have the support of the university.

Because it is a rigorous process, the support is essential for the faculty throughout the process who are committed to the assessment and data collection process that is essential in the ABET process.

Second, one important element is to consider in advance is the actual student data collection. Student data can either be collected manually or digitally. The manual collection of data may require that the student work is actually digitized. Depending on the collection methodology, pages may be unmarked or stapled together causing difficulty for digitization. Also, many courses employ a Learning Management System (LMS). Depending on which course tasks are employed for assessment, it can be difficult to collect all the student data out of the LMS. Therefore, think carefully in advance on how the actual data will be further collected and categorized.

Third, having an external visiting professor, an external ABET expert and an additional consultant help with the ABET process was a huge benefit for the full-time faculty as they helped the process go smoother by alleviating some of the paperwork and offered guidance. The external consultants also helped with the readiness report and the self-study report. These were essential to the process and valuable resources to the faculty.

### 5.2 Future Research

There are many paths for future research. First, we can explore assessments in other courses within our Cyber Security Systems program which are currently employing ABET assessments. Second, we can report on our self-study reflections of our program.

Third, we can report on our continual improvement metrics. Such metrics may involve changing our course prerequisites, adding additional courses to our curriculum, changing assessment tasks, among others.

## 6. Conclusions

The ABET cybersecurity assessment process has been very insightful. First, it motivates faculty to deeply reflect on their courses from the point-of-view of student outcomes. Second, it provides motivation for faculty to communicate and plan topics within each course. Third, it provides motivation for faculty to communicate with students to learn about their difficulties. Overall, it is a very large time commitment; however, the students' learning is the focus.

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# Teachers' Beliefs about Formative Assessment in the Pupil-Centered Curriculum

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## Abstract

*Formative assessment is an active process by which teachers regularly check their pupils' knowledge and understanding during classes and provide them with appropriate feedback. Teachers' competence to apply different forms of assessment to pupils' achievement influences pupils' motivation to learn and individual achievement* [1]*. Encouraging pupils to engage in self-assessment involves active engagement of the learning subject is crucial for the pupil to take responsibility for his/her learning* [2, 3, 4]*. This paper aims to examine teachers' attitudes about the use of formative assessment and to determine the link between teacher attitudes and the frequency with which pupils use forms of assessment and self-assessment in educational practice. For this purpose, the Scale of Teachers' Beliefs about the Application of Formative Assessment was constructed, whereby teachers assessed their degree of agreement with the items on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The research comprised a sample of 115 elementary school classroom teachers from 12 elementary schools in three counties of the Republic of Croatia. Assessment sheets (protocols) were used to gain a deeper insight into teachers' experiences in applying formative assessment and the collected data were processed through qualitative analysis. The results show that teachers emphasize the benefits of formative assessment, but at the same time do not feel fully competent to implement it, which affects the frequency with which various forms of formative assessment are applied. Most often, they use pupils' self-assessment and peer assessment. They outline different ways of performing formative assessment through thought-out tasks, using both digital tools as innovative and student-oriented ways to test the adoption of learning outcomes. Teachers cite lack of time as the most aggravating factor in the quality of formative assessment during the class. There is a need for further professional development in strengthening the competences for the implementation of various forms of student-centred assessment.*

*Keywords: curriculum, formative assessment, self-assessment, pupils, teachers*

## 1. Introduction

In contemporary educational contexts, the emphasis lies on the pupil-centered curriculum. Teachers are "responsible for many experiences that influence pupils' learning, and their beliefs directly affect the interpretation and importance they attach to their teaching experience" [5, pp. 134-135]. Teachers' beliefs largely determine their willingness to apply formative evaluation in educational practice. This implies strengthening the teachers' competence to apply different forms of evaluating pupils' achievements. Teachers' competences are understood as a complex combination of knowledge, skills, understanding, values, and attitudes, focused on quality action throughout the curriculum [3]. Verifying curriculum outcomes through a continuous active

process implies formative evaluation. Therefore, teachers' beliefs about formative evaluation in the contemporary educational context are more than essential to the achievement of pupil-centered curricula, and this paper will rely on their empirical research.

## 2. Theoretical Background

A review of research on learning and teaching highlights three categories of experiences that influence beliefs and teacher knowledge: personal experiences, experiences based on formal knowledge that includes subject knowledge, attitude towards the learning content, and teaching methods, as well as school and classroom experiences, or all experiences that have shaped the idea of what teaching is and what the teacher's work includes [5]. Assessment is one of the important factors of continuous improvement of educational work. Beliefs influence the learning process and the change process they are involved in [6] and largely determine the teachers' willingness to apply formative assessment, provide feedback to pupils, and encourage pupils to engage in self-assessment in educational practice. The assessment accelerates progress because it sets clear learning goals [7]. Unlike summative assessment, which aims at an assessment of learning, formative assessment is assessment for learning aims to improve the learning process and learning outcomes of pupils with different abilities and experiences. Formative assessment is an active process by which the teacher regularly checks the knowledge and understanding of his pupils during class and provides them with appropriate feedback [8]. The key strategies come from considering the three instructional processes [9], "where the learners go in their learning, where the learners are right now in their learning, and what needs to be done to get where they are going," and three agents in the classroom, "teachers, the individual pupil, and peers." In order for formative feedback to provide insight into the different components, it is necessary that the assessment is carried out in different contexts and that the teacher uses different forms and techniques of formative assessment in their work. The objective of formative assessment is to increase the pupils' commitment to learning and self-assessment. With regards to the self-assessment process, pupils should be familiar with the learning outcomes and performance criteria [7]. A well-designed and conducted formative assessment should suggest to the teacher what the pupils know and can do [10].

Precisely self-assessment is an important component of formative assessment that strengthens pupil-teacher collaboration in the joint process of learning and teaching and contributes to creating a comfortable classroom environment that encourages collaboration and achievement of the pupil-centered curriculum outcomes. The main objective of this research was to examine teachers' beliefs about the use of formative assessment in educational practice. The study focuses on the following three research questions: (1) to examine teachers' beliefs about the use of formative assessment in the educational process; (2) to examine the frequency of using forms of assessment and pupil' self-assessment in educational practice; (3) to examine the relationship between teachers' beliefs about the use of formative assessment and the frequency of assessment and pupils' self-assessment in educational practice with regards to their work experience and class being taught. Finally, a qualitative thematic analysis of the assessment sheets (protocols) provides a brief overview of teachers' experiences in applying formative assessment in their teaching.

## 3. Method

### *Participants*

The survey involved 115 classroom teachers from 12 elementary schools in three counties of the Republic of Croatia. Of the total number of participants, 112 (97.4%) were female and three were male (2.3%). The age of the participants ranged from 24 to 66 years and the average age of the participants was 46 years (SD=8.024). The number of teachers included in the survey with respect to the teaching grade is as follows: first-grade (N=30, 26.1%), second-grade (N=24, 20.9%), third-grader (N=32, 27.8%), and fourth-grade teachers (N=29, 25.2%).

### *Instruments*

For the purposes of this research, a questionnaire was developed for classroom teachers on the application of formative assessment in educational practice and two scales were applied: "Scale of Teachers' Beliefs about the Application of Formative Assessment", which, after conducting a factor analysis, counts five items, examined teachers' beliefs about the use of formative assessment in educational practice (the factor extracted explains 48.40% of the variance), and second scale, "Scale of Assessment and Self-Assessment Frequency", comprising seven items, examined how often teachers use forms of assessment and self-assessment in educational practice (the extracted factor explains 56.46% of the variance). Assessment sheets (protocols) were used to gain a more complete insight into teachers' experiences in applying formative assessment.

### *Procedure and Data Analysis*

The research was conducted in 2019 among classroom teachers in a total of 12 elementary schools in three counties in the Republic of Croatia, selected by the random selection method. The obtained research results were analysed with the statistical software SPSS 22.0 program. To examine the metrical characteristics of the Scale of Teachers' Beliefs about the Application of Formative Assessment, we conducted a reliability analysis and exploratory factor analysis using the main component method with oblimin rotation. The Pearson correlation analysis examined the relationship between teachers' beliefs about the use of formative assessment and their frequency of using forms of assessment and self-assessment in practice with regards to years of work experience. One-way analyses of variance examined differences in the mean score on the Scale of Teachers' Beliefs about the Application of Formative Assessment and the Scale of Assessment and Self-Assessment Frequency with regards to the class being taught. Assessment sheets (protocols) that outline teachers' experiences of applying formative assessment were addressed through a qualitative analysis.

## 4. Results and Discussion

### *Teachers' Beliefs about the Application of Formative Assessment*

The one-factor solution was tested using the principal components method. The factor extracted explains 48.40% of the variance. From the results shown in Table 1, it is evident that all item correlations with the total result are sufficiently high (>.40).

*Table 1. Descriptive data for individual items on the Scale of Teachers' Beliefs about the Application of Formative Assessment*

|  | M | SD | $r_{it}$ |
|---|---|---|---|
| Formative assessment is worth my effort. | 3.97 | 0.74 | 0.44 |
| I have the necessary supporting materials to apply formative assessment. | 3.60 | 0.90 | 0.68 |
| Formative assessment makes my teaching easier. | 3.65 | 0.80 | 0.75 |
| I have sufficient time to apply formative assessment. | 3.09 | 0.94 | 0.57 |
| I possess the necessary knowledge and skills to apply formative assessment. | 3.75 | 0.88 | 0.60 |

Legend: arithmetic mean – M, standard deviation – SD, total score on the Scale ($r_{it}$).

The results on the Scale of Teachers' Beliefs about the Application of Formative Assessment clearly indicate the teachers' belief that "Formative assessment is worth my effort" (M=3.97). The qualitative analysis conducted and the teachers' experience in applying formative assessment in their teaching points to teachers' positive beliefs about formative assessment as well as teachers' efforts to put this form of assessment into practice. For example, one of the participants of the conducted qualitative research highlights that "Formative assessment is very welcome. I try to keep track of the student's efforts to achieve knowledge" (participant 15). At the same time, the results of the descriptive analysis show a positive belief "I possess the necessary knowledge and skills to apply formative assessment." (M = 3.75), while the qualitative analysis reveals that teachers interpret the term "formative behaviour" differently – they identify it with notes monitoring pupils' work. It is significant to establish the understanding of the term formative assessment given the teachers' high self-assessments in the possession of the necessary knowledge and skills to apply formative assessment. The lowest belief is expressed in the item "I have sufficient time to apply formative assessment" (M=3.09).

Vingsle [11] highlights the complexity of formative assessment practice. She concludes that there is a lack of self-criticism in the assessment of one's own knowledge of formative assessment and a necessary assumption of responsibility for the correct application of formative assessment, whereby the aggravating circumstance certainly lies in the lack of experience in its implementation. The reliability coefficient of internal consistency Cronbach alpha (.81) indicates the Scale's good internal consistency. All items are formulated in the same direction, so that a higher score indicates more positive beliefs about the use of formative assessment. The theoretical range of scores on Scale extends from 2 to 5. The result of the Shapiro-Wilk test examining distribution normality (S-W=0.98, p>.05) indicates that the variable was normally distributed. The arithmetic mean score (M=3.63) indicates moderately positive teachers' beliefs about the use of formative assessment.

### Frequency of Assessment and Self-assessment

The one-factor solution was tested using the principal components method. The extracted factor explains 56.46% of the variance. It is evident from the results (Table 2) that all the correlations of the items with the total result are sufficiently high (>.40).

*Table 2. Descriptive data for individual items on the Scale of Assessment and Self-Assessment Frequency*

|  | M | SD | $r_{it}$ |
|---|---|---|---|
| Formative assessment as one form of assessment | 3.70 | 0.76 | 0.48 |
| Tasks to perform formative assessment that you designed yourself | 3.36 | 0.84 | 0.57 |
| Diagnostic questionnaires (check-lists and rating scales) | 2.94 | 1.04 | 0.65 |
| Opportunity for pupils to self-assess their work | 3.73 | 0.80 | 0.68 |
| Opportunity for pupils to assess the work of other pupils | 3.71 | 0.88 | 0.65 |
| Opportunity for pupils to assess your work | 3.18 | 0.99 | 0.72 |
| Self-assessment lists | 2.91 | 0.99 | 0.77 |

Legend: arithmetic mean – M, standard deviation – SD, total score on the Scale ($r_{it}$).

It is observable (Table 2) that the teachers agree to the greatest extent that in their educational practice they provide "Opportunity for pupils to self-assess their work" (M=3.73) and "Opportunity for pupils to assess the work of other pupils" (M=3.71).

Encouraging pupils to engage in self-assessment involves the activity of the learning subject, aimed at assessing the level of achievement of teaching objectives [4] and is crucial for the pupil to take responsibility for their learning [2, 3]. This indicates that pupils are active participants in the teaching process, but it remains an open question whether pupils formulate feedback on their self-assessment and assessment of other pupils clearly and how the teacher uses the pupils' feedback to improve the process. Self-assessment and peer assessment should not be an end in itself, but the teacher should be given the opportunity to influence their future guidance based on the feedback provided by the pupil. The reliability coefficient of internal consistency Cronbach alpha (.87) indicates a high internal consistency of the scale. All statements are formulated in the same direction, in such a way that a higher score indicates a higher frequency of using assessment and self-assessment in practice. The theoretical range of scores on the scale extends from 1 to 5. According to the result of the Shapiro-Wilk test (S-W=0.98, p>.05), the variable was normally distributed. The arithmetic mean score on the Scale (M=3.36) indicates a moderate frequency of using assessment and self-assessment in practice.

### Relationship Between Teachers' Beliefs About the Use of Formative Assessment and the Frequency of Using Assessment and Self-Assessment with Regards to Work Experience and Class Being Taught

Pearson's correlation coefficient examined the association between teachers' beliefs about the use of formative assessment and the frequency of using forms of assessment and self-assessment in practice. The correlation coefficient obtained (r=.42, p<.01) indicates a positive correlation between the scores on the two Scales. Teachers with more positive beliefs about the use of formative assessment are more likely to use assessment and self-assessment in practice and vice versa (those with more negative beliefs are less likely to use assessment and self-assessment in practice).

Pearson's correlation coefficients between teachers' work experience and their score on the sale of the Scale of Beliefs about the Application of Formative Assessment and the Scale of Assessment and Self-Assessment was calculated. No significant correlations were obtained for the Scale of Beliefs about the Application of Formative Assessment (r=.03) and the Scale of Assessment and Self-Assessment (r=0.9). One-way analyses of the variance examined differences in the average score on the Scales

with respect to the grade being taught. No statistically significant differences were obtained on the Scale of Teachers' Beliefs about the Application of Formative Assessment ($F_{(3, 110)}=1.05$; $p>.05$), nor on the Scale of Assessment and Self-Assessment with regards to the class being taught ($F_{(3, 111)}=0.85$; $p>.05$).

### Teachers' Experiences of Applying Formative Assessment

Teachers' experiences of applying formative assessment, obtained through assessment sheets and covered by qualitative thematic analysis, will only be briefly presented due to space restrictions. Teachers emphasize the importance and usefulness of applying formative assessment and support its implementation ("I find this type of assessment excellent and most objective" (participant 1); "Formative assessment is useful for the teacher to gain insight into pupils' chronological progress and acquisition of knowledge" (participant 20)). In applying the various forms of formative assessment, in practice, pupils' oral and written feedback as well as self-assessment and peer assessment are used, including digital tools ("I use formative assessment sheets and self-assessment cards and peer assessment" (participant 19); "I use different digital assessment tools like *Kahoot*" (participant 9)). They emphasize that the lack of time, but also insufficient competence, is an aggravating factor for the effective implementation of formative assessment, and they emphasize the importance of continuous education ("Formative assessment requires from the teacher additional time, effort, and preparation, as well as assessment knowledge" (participant 12); "I am still in search of a good strategy for implementing this assessment method" (participant 16)).

## 5. Conclusion

Based on the empirical research, it may be concluded that teachers have moderately positive beliefs about the use of formative assessment and a moderate frequency of using assessment and self-assessment in educational practice. Teachers who have more positive beliefs about the use of formative assessment are more likely to use assessment and self-assessment in practice, and vice versa; those with more negative beliefs are less likely to use assessment and self-assessment in practice. No significant correlations were found between teachers' work experience and their beliefs about the use of formative assessment and the frequency of using forms of assessment and self-assessment in practice, or with regards to the grade being taught. Teachers' experiences obtained through assessment sheets show how teachers apply different forms of formative assessment in their educational practice, using digital tools as an innovative way of verifying the adoption of outcomes. The greatest aggravating factor for the quality of formative assessment during teaching is the lack of time. A teachers' beliefs directly affect the interpretation and importance which teachers attach to their experience of assessment. Therefore, in the initial and professional education of teachers, emphasis should be placed on enhancing teachers' competences to carry out different forms of assessment.

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# The Future as a Return to the Past – a Look at the Concept of Energy and its Importance in Education

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## Abstract

*Energy has been part of the physics curriculum from time immemorial. At first it worked in the field of mechanics, electricity and magnetism, nuclear physics and gradually its knowledge about reached the point of knowledge, when it began to charge and develop the field of quantum mechanics.*

*If we look at the latest knowledge of science, we will find that physics itself is not the only science that deserves new discoveries. New discoveries depend on knowledge of other scientific disciplines.*

*In our paper we look at the approach of the concept of energy in the educational sphere of physics from an ontological point of view. Furthermore, we analysed the concept of energy in science textbooks – chemistry and biology, where we highlight the areas that are connected by the phenomenon of energy transformation. Finding intersections between science subjects specified areas of energy transformation that we focused on when determining whether students perceive the concept of energy from a holistic perspective. In addition to the analysis of the content of textbooks, we focus on the conceptual equipment of grammar school students. The research sample consists of 200 students who participated in the creation of concept maps focused on the concept of energy. In this paper we compare the conceptual structure of students in primary and secondary school. The analysis of textbooks as well as the analysis of students' conceptual equipment form a springboard for further progress on how best to enrich the physics curriculum so that teachers already know what constructs students will come up with, which is risky in applying new knowledge, finding misconceptions and removing properly incorporated into the knowledge structure.*

*Keywords: The concept of energy, Conceptual maps, interdisciplinarity links*

## 1. Introduction

In order to be able to contribute to the teaching process with something more beneficial and interesting for the students, we also have to look back to the past. We need to make an overview of what is already effectively implemented in teaching and vice versa, what could be supplemented or enrich and thus bring closer to students the concept of physics or a physical problem that is difficult for them to understand [1], [2], [3], [4]. There are many good new methods like remote experiments or computer-based experiments that perform several functions in teaching physics from motivation to successful demonstration of new knowledge that contributes to the correct understanding of new knowledge of students. In this article, we want to focus on understanding the concept of energy in students, which they create in their minds in the already implemented learning processes. We focus on the conceptual analysis of science textbooks for secondary schools in Physics, Chemistry and Biology. With this,

we identified areas that are important in the teaching of energy to cover its meaning in all areas of science. It is such a view of energy that meets one of its characteristics and that is the transformation of energy. An interesting question for us is whether they know how to create such links and connections within science subjects, which are also related to the knowledge contained in the curriculum of other science subjects such as independent physics. The concept map is an observable demonstration of whether students can recall restore the conceptual structure focused on the energy in their minds.

Energy is one of the basic concepts in physics, which appears in all its areas from mechanics to quantum physics. This concept encompasses a very wide range of its definitions with respect to the area in which it mentioned. "*We use energy as a word in everyday communication with the obvious and in the free sense. It is not possible to make a simple definition that includes all its aspects. Therefore, even when teaching physics, it must be built gradually, from its simplest form in mechanics to general considerations.*" [5] This statement about the physics quantity of energy encourages us to avoid it in the school environment with its non-physical significance for students. What we can expect as a teacher? What concepts have our students? How will be the concept database of primary (in the text we use as elementary) school students who will come to secondary (in the text we use as high) school? We sought answers to these questions using the conceptual mapping method. We expected the general meaning of the concept energy in the concept maps of elementary school in a larger number, more than half of the concepts. However, this assumption has not been confirmed to us.

### 1.1 Ontological Point of View in the Educational Sphere of Physics

Scherr [6] distinguishes three main area of ontology about energy from a didactic point of view: energy as a metaphorical substance, energy as a stimulus to action and energy from a vertical point of view. Understanding ontology should lead to understanding of energy concepts from a professional point of view. The first area of ontology (energy as a metaphorical substance) includes the properties of energy (conservation, transmission, presence in objects, flow). The second area is understood as a stimulus that affects objects. The third understanding of ontology as a vertical position speaks of the arrangement of sets of vertical positions. In this article, we start from the first type of ontological perception of energy as a metaphorical substance. We specifically focus on one of the properties of energy, which is the conversation of energy in the analysis of textbooks. It is this property that can ensure the concept of energy in all subjects, as pointed out by this fact Heron *et al*., [4], where they claim that "*the basic role of energy is the unification of phenomena*" [4]. Students come to contact with it at various levels of education.

### 2. Methodology

We present the results of the analysis of science textbooks in Chapter 3. These are textbooks of biology, textbooks of chemistry and physics for secondary schools. They are intended for students of the first and second year of high school (age 14 to 17 years).

We selected terms that are related to the concept of energy from individual thematic units and curriculum. We wrote them into the program Gephi, which created a network of given concepts. Every single term represents a node, and we have expressed the relationship between the terms using edges. We marked the terms from the chemistry textbook in red colour, the terms from biology in blue colour and the terms from physics in green colour. The network created in this way helped us to identify concepts with technical meaning that should appear in the student concept maps, which we analysed in section 4. In the results, we listed the most common technical concepts among high

school students and elementary school pupils. We observed how the number of technical terms changed in comparison with commonly used terms. We explained to the students of high school the principle of creating a concept map as well as its use in learning due to nationwide distance learning in Slovakia for Covid-19 using the WebEx videoconferencing system. We attached a questionnaire to the students to the concept maps. The questionnaire had open questions about energy to specify their thought processes and ensure the correct analysis of their concept maps and classification of concepts into the category of concepts. The work by Novak [7] helped us how to tutor students and pupils to create concept maps by the correct procedure. Students could create a concept map manually or using freely available programs.

### 3. Analysis of Textbooks and Concept Maps Created by Students of High School

"*Energy permeates all areas of physics, in which it appears in several forms. In general, we do not find an area in science where energy does not play a role. Energy can explain physical as well as biological phenomena, while not avoiding discussions in the socio-political field*" [3]. There is reason why we looked at the content of textbooks of physics, textbooks of biology and textbooks of chemistry, where we looked for areas related to the transformation of energy that which permeates all science subjects, and thus creating a holistic view of the energy. The content of the given subjects should be gradually built into the knowledge network of the student. This network should carry information of concepts in the transformation of energy in individual science subjects.

We have selected thematic units and specific curriculum in which the transformation of energy appears by analysing textbooks of scientific subjects. We chose the concepts which high school students should incorporate their knowledge structure from the given topic. These concepts are illustrated graphically using the network created in the Gephi program in Fig. 1. We refer to the displayed concepts as technical concepts.



*Fig. 1. Technical concepts of energy and their connection in biology, chemistry and physics textbooks (biology – blue colour, physics – green colour, chemistry-red colour) for first and second year of study in high school in program Gephi*

We have identified areas, according to the captured relationships and connections between the concepts, that relate to the transformation of energy connecting all the mentioned scientific objects and thus creates a global view of energy. These areas are: Thermodynamic law, electrolysis, chemical bonding, metabolism, transformer, radioactivity, Bernoulli's equation, mechanical oscillator, sound, power station.

The individual identified areas related to energy conversation inform the teacher where he has opportunity to emphasize the integrative and in the same time interdisciplinary nature of energy. We state the number of concepts mentioned in the student's concept maps who are on the high school in the first year and second year of study. These mentioned concepts are component of the network of technical concepts which is created on Fig. 1. In the Table 1. we present the number of concepts mentioned in the student's concept maps and the number of concepts in the network created by program Gephi.

| Sphere | Concept maps | | Gephi | |
|---|---|---|---|---|
| | 1st year N | 2nd year N | 1st year N | 2nd year N |
| **Physics** | 97 | 90 | 36 | 46 |
| **Biology** | 19 | 4 | 18 | 23 |
| **Chemistry** | 25 | 11 | 20 | 20 |
| **summary** | **141** | **105** | **74** | **89** |

*Table 1. The number of concepts mentioned in the student's concept maps and the number of concepts in the network created by program Gephi*

Eight concepts appeared an average in the concept maps of the first year of study in high school. In one concept map of a first-year student, were average represented, 87% of physics concepts, 10% of biological concepts and 6% of chemical concepts fall on average. Nine concepts appeared of an average in the concept maps of the second year of study on high school. In one concept map of a second-year student, were average represented, 94% physics concepts, 5% biological concepts and 2% chemical concepts.

## 4. Comparison of Concept Maps of Pupils in Elementary School and Students in High School

We compared the conceptual maps representation of the concept energy in high school students and elementary school pupils. Eleven concepts appeared of an average in the concept maps of the students on high school. All students of high school (129) used 1414 repetitive concepts in their concept maps. Students mentioned 111 concepts from physics, of which 22 concepts from the field of energy, 20 concepts from the field of energy properties, 45 concepts from the field of energy as a physical quantity, 24 concepts indirectly related to the concept of energy. Common concepts were mentioned by high school students 45 concepts were mentioned in the field technology, 72 concepts in the field of biology. In one concept map of second year student, were average represented, 75% physics concepts, 7% biological concepts, 4% chemical concepts, 17% technology concepts and 3% common concepts.

Ten concepts appeared of an average in the concept maps of the nineth year pupils of study in elementary school. All pupils of nineth year in elementary school (31) used 308 repetitive concepts in their concept maps. Student mentioned 75 concepts from physics, 28 common concepts, 7 concepts from chemistry, 38 concepts from technology and 14 concepts from biology. In one concept map of a nineth year student, were

average represented, 53% concepts of physics, 25% common concepts, 4% chemical concepts, 10% technology concepts, 7% biological concepts.

In the Table 2. present an overview of the comparison of concepts mentioned in the concept maps of high school *G* and pupils of elementary school *E* whose were most frequently mentioned. We have selected the 5 most frequently used concepts from each field (physics, biology, technology, chemists, common). The number *N* of concepts used is given in parentheses.

| Physics | | | | Common | | | |
|---|---|---|---|---|---|---|---|
| *G (N)* | | *E (N)* | | *G (N)* | | *E (N)* | |
| kinetic | 108 | heat | 11 | sun | 35 | sun | 17 |
| potential | 95 | magnet | 8 | water | 33 | light | 11 |
| electric | 80 | electric | 7 | wind | 26 | wind | 7 |
| Joule, J | 70 | electricity | 7 | light | 21 | electric | |
| thermal | 63 | lightning | 6 | run | 6 | motor | 7 |
| | | friction | 6 | | | battery | 5 |
| Chemistry | | | | Biology | | | |
| *G (N)* | | *E (N)* | | *G (N)* | | *E (N)* | |
| atom | 5 | atom | 4 | nature | 5 | photosynthesis | 4 |
| chemical bond | 4 | core | 2 | sunlight | 5 | energy in body | 3 |
| binding energy | 3 | neutron | 2 | sugar | 4 | nature | 3 |
| chemical reaction | 3 | proton | 2 | respiration | 4 | sugar | 2 |
| chemical compounds | 3 | electron | | photosynthesis | 4 | fat | 1 |
| | | shell | 1 | motion | 4 | | |
| Technology | | | | | | | |
| *G (N)* | | | | *E (N)* | | | |
| power station | | 23 | | bulb | | 8 | |
| waterpower station | | 15 | | battery | | 7 | |
| renewable resources | | 11 | | nuclear energy | | 3 | |
| coal, oil, natural gas | | 11 | | electrical appliances | | 2 | |
| solar panels | | 11 | | solar power station | | 2 | |

*Table 2. The most of 5 mentioned concepts in the concept maps of students in high school G and pupils in elementary school E*

## 5. Discussion and Conclusion

In this paper we compared the concept maps of high school students with the concepts contained in the network processed by the Gephi program. We also compared their concept bank with the concepts contained in science textbooks. The number of used concepts in the conceptual maps created by students of the first-year high school exceeds the number of technical concepts in the content of the textbooks of physics, textbooks of biology and textbooks of chemistry. There is a noticeable difference in the number of technical concepts from biology and chemistry for second year students.

They clearly outperform the concepts associated with the subject of physics. We can see a clear attachment to the perception of the concept of energy from the point of view of physics for second year students. The conceptual representation of chemistry is more than half, which is not as weak as in comparison with biological concepts. There are less than one fifth of the maximum possible achievement of the boundary of concepts that are represented in the textbook content. The reason that students mentioned more concepts in connection with physics than was determined by the analysis of textbooks

is that they introduced more specific things to the concepts, respectively more specified some parent concepts. A larger conceptual database of physics may also indicate that concept maps were made within the subject of physics. It would be interesting to follow concept maps that they would process in a chemistry or biology class. Another possible reason could be that students are more tend towards physics, have to her the better relationship to her, e.g., to biology, with which we monitor the low number of listed concepts. The concept of energy appears in every area of physics what cannot be say about other science subjects. Students able to expand knowledge from primary school and at the same time apply it. The students of the first year of high school stated a total of half more technical concepts than the maximum value of the concepts for the content of the physics textbook for the first year. The students of second year of high school exceeded this limit by six concepts. The students of the first year of high school introduced more than half of the technical concepts in all areas. The students of the second year of high school were low below half the limit in the field of biology concepts.

The students of the first year of high school are better like the students of the second year, because they mentioned more technical concepts in their concept maps. The number of students involved in the research were 67 students of first year study and 62 students of second year of study in high school. The students of first year of study to see a holistic view of energy. They can see it like energy is phenomenon which is the same phenomenon in the other subjects. Students of the second year of study see the energy from the one view and it is from the physics sphere. Therefore, we recommend that high school teachers use appropriate ways of involvement between different concepts of energy in their teaching. These were determined by the results of teaching and other areas that were determined by the results of teaching and other areas that were looking for this we were looking in area 3.

### *Acknowledgement*

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# Education and Healthcare

# Challenges and Opportunities for Social and Emotional Capacity Building: Suggestions for Educational Contexts from PSsmile Erasmus+ Project

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## Abstract

*Social-Emotional Capacity Building refers to the actions tailored to the construction of "knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions" [1]. Recent studies describe the nature and structure of these skills, their development and relevance for a wide range of individual and societal outcomes [2], [3], [4]. There are numerous challenges that children and school have often to face in contemporary Europe and these skills are relevant for learning and psychological wellbeing, especially for children who present with vulnerabilities. Core Social-Emotional competencies can be taught in different ways and settings through explicit and specific instructions, teacher instructional practices, integration with academic curriculum areas, and organizational strategies. But addressing the numerous challenges of children of these times requires innovation in teaching strategies and in technology. With this in mind, the presentation will first of all highlight the contribution in terms of opportunities emerging from research studies and projects conducted in Europe, and from the national reports and transnational analysis carried out by partners of the Erasmus+ Strategical partnership project on Socio-emotional Capacity Building in Primary Education (PSsmile.emundus.eu). Some examples will be then provided of resources, together with technologically supported environments developed (e-learning, e-courses, apps). Strengths and weaknesses in programs available will be shown as well as recent more innovative attempts for developing and testing effective technological supports. Finally, issues, goals and relevance for policy and current school practices will be described.*

*Keywords: Social-Emotional competencies, socio-emotional learning, socio-emotional education, emotions development, social-awareness, self-management, relationship skills,*
*social awareness, responsible decisions*

## 1. Introduction

Social and Emotional Learning (SEL) is defined as: "*the process through which children and adults acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions*" [2]. It includes five interacting fields:
1.  *self-awareness* (the ability to understand one's own emotions, personal goals and values),

2. *self-management* (the ability to regulate affect and calming oneself down),
3. *social awareness* (the ability to understand others and take the perspective of those with different backgrounds and cultures, and to act with empathy and compassion),
4. *relationship skills* (the ability to communicate clearly, to negotiate and to seek help, when needed) and the ability to,
5. *take responsible decisions.*

As several studies have already acknowledged the relevance of socioemotional education for learning and psychological wellbeing of children and adults [4], [5], many countries in Europe, which recognized the numerous challenges that children and schools have to face, already included SEL within their national policies. Nonetheless, present scenario appears fragmented. To shed some light on the opportunities opened by SEL and the current situation in Europe, this study will (i) provide a general overview of SEL in the context of European research, project and European countries national policies (Portugal, Greece, Bulgaria, Lithuania, Italy), (ii) present resources, as well as technologically supported environments developed, (iii) discuss strengths and weaknesses in programs available, together with innovative attempts for developing and testing effective technological supports, and, finally, (iv) describe issues, goals and the relevance of SEL for policy and current school practices.

## 2. Socio-emotional Learning and Education in Europe

Several studies have been conducted in the fields of Psychology and Educational Sciences to implement SEL programs in school settings. They mainly focused on Primary and further Basic Education. Also, municipalities, NGOs and enterprises are involved in publication and implementation of SEL researches to complement the lack of resources and activities delivered in public schools.

Despite the important contribution of these researches, which often emphasized positive results, some deficiencies can be recognized. First of all, they are quite limited, as they evidence the need for contextual adjustment, choice of adequate assessment and the inclusion of more students. Moreover, they often do not cover the whole range of SEL, since they are mainly focused on emotional competence, leaving aside its social aspect, or vice versa. These deficiencies are reflected in European countries' national policies and European projects, which will be discussed in this section [6].

### 2.1 National policies

Generally speaking, all countries analysed in *PSsmile* project developed under Erasmus+ KA201 programme (Portugal, Greece, Lithuania, Bulgaria and Italy) are investing in socio-emotional development. These actions are usually carried out by the national ministries of education or health, and they are developed according to two different perspectives working in synergy. Firstly, socio-emotional development is regarded in terms of health and, secondly, SEL projects and programs are supplemented to take preventive action. Thus, a more health centered model emerges more frequently, instead of following the biopsychosocial model of health suggested internationally [7].

Moving from this consideration, efforts aimed at providing SEL in schools are focused on improvement and acquisition of skills and competences for life. For instance, Portuguese Ministry of Health committed to SEL as a way to improve mental health and reduce risky behaviours in children and young adults. Similarly, Greece is taking actions to promote children psychosocial health to develop school-based preventive measures, while Lithuania is making efforts to apply SEL in order to reduce violence towards and

among children, prevent bullying and substance abuse. Differently, in Bulgaria and Italy, SEL measures are connected to inclusive education and SEL skills are included as part of the competences that students should acquire, although they are not formally included in the curricula [6].

Although European countries' interest in SEL can be undoubtedly regarded as positive, there are still many deficiencies. First of all, the situation is too fragmented and it results in the presence of multiple diverse initiatives, hardly transferable in other contexts. As a matter of fact, all the countries analysed require schools to take action independently and intercept the specific needs of students. This fact produces high heterogeneity. Similarly, although the provision of training is regarded as important, training provided differ in length, depth, formal recognition and content. Finally, all countries designate differently the professionals who are expected to provide socio-emotional education, adding more barrier to the consolidation of a common and comprehensive European vision of SEL.

Moving towards the analysis of European projects, it will be seen that such heterogeneity is recognizable even in their contexts.

### 2.3 SEL in European projects

Within *PSsmile's* transnational report, particular attention has been devoted to three projects related to SEL:

**RESCUR Surfing the waves** (www.rescur.eu) developed a curriculum based on resilience for early years and primary schools. It makes use of experiential and participative learning focused on skills development to reach explicit learning goals, i.e., building healthy relationships, developing a growth mindset, self-determination, and others.

**EAP_SEL (European Assessment Protocol for children's SEL Skills)** (www.eap-sel.eu) undertook an evidence-based education (EBE) approach for the development of a standardized assessment protocol and to offer evaluation guidelines for social and emotional skills in children, in order to provide high-quality SEL. Main results of the project are (i) a teacher training, (ii) a curriculum containing materials for classrooms and (iii) the integration of ICT in SEL.

**EBE-EUSMOSI (Evidence Based Education: European Strategic Model for School Inclusion)** (www.inclusive-education.net) combined EBE approach to inclusive education for students with "special educational needs" (SEN). Activities are proposed following 9 criteria aimed at providing implementation of inclusive education. It also designed the PROSEL (Pro-sociality and Social Emotional Learning) curriculum, which is specifically tailored to fulfil inclusive goals in primary school.

One positive aspect of EU projects is that they provide an opportunity for networking, allowing people and institutions interested in social and emotional development to devise new material, resources, curricula and practices that take into account different cultural contexts. In this way, results are available to a wide public of organizations and individuals.

Nonetheless, current EU projects are still representing the same fragmentation noticed in national policies and practices. As the examples provided above show, socio-emotional development is integrated to reach different goals and, sometimes, it is not adopted in a comprehensive manner. Moreover, recent studies evidence the relevance of adopting a community-based approach, in order to involve significant persons from different contexts of life. Not all projects do so, as often parents and families are sometimes neglected. To provide a more effective and comprehensive SEL, training should be imparted also to parents and educators. In addition, attention is mostly drawn

on developing knowledge about programs and curricula, leaving limited consideration to the building of socio-emotional skills in teachers and educators themselves. Since their influence on children's life is considerable, this aspect should not be neglected. Finally, as the complexities of these times threaten wellbeing, SEL should focus also on everyday situations. However, all the curricula and activities described are still strongly based on management of current life and do not pay attention to future.

## 3. Suggestions for further steps

Despite its drawbacks, the situation is rapidly changing, as many countries already recognize the relevance of socio-emotional education (SEE) for their educational system and their countries in general. Institutions are aware and committed in support of socio-emotional education. Moreover, different projects already provide relevant material and resources for the implementation of SEE in different contexts.

However, to further improve results of current efforts, some actions need to be taken:
1. Focus should be on both Social and Emotional skills, with a similar emphasis;
2. Focus should not only be on awareness development, but also on management of everyday situations;
3. Specific attentions should be devoted to diversities, vulnerabilities and learning difficulties;
4. Practices should be updated to recent theoretical approaches;
5. Innovative methodologies should be devised, paying particular attention to flexible and personalized use;
6. Socio-emotional skills should also be taught to teachers and parents;

## 4. Conclusions

As SEL start receiving more attention and more efforts are made to its implementation in schools, its benefit will soon spread. Among its short term and more immediate benefits SEL will provide:
1. Improved interactions and relationships in the classroom;
2. An increased ability to manage conflictual interactions and decision making;
3. Better attitudes about themselves, others, and school [8]

In the long term, SEE would help students become proactive and confident citizens who know how to set their personal goals and how to achieve them, playing a relevant impact on personal success. Looking from a wider perspective, social and emotional skills will help flourish societies and nations, favouring understanding, empathy, compassion, but also problem solving and critical thinking skills. As a matter of fact, a UNESCO report presented socio-emotional skills as essential to the attainment of UN Sustainable Development Goals (SDGs). In their own words, Socio Emotional capacity building is directed "*towards building emotionally resilient individuals who are able to navigate the complex landscape of conflicting goals and dissonance to one of prosocial behaviour that promotes human flourishing and the attainment of the SDGs*" [9]. Thus, by understanding the considerably important role of SEE, this study aimed to highlight current scenario in Europe and provide important suggestions for its further development. More detailed information and further outcomes could be found at pssmile.emundus.eu.

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# Coping with Occupational Stressors.
# Cross-Sectional Study in Three Kindergartens

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## Abstract

*Employees in 3 kindergartens participated in the current study by filling in a questionnaire during their routine medical check-up, based on: Brief COPE (SC Carver), Rotter J. (1966) locus of control questionnaire, Maslach burnout inventory, perceived self-efficacy scale, Work ability index (WAI), as well as demographics (age, gender, type of residence, level of education, and income), and 16 occupational stressors (stress level) such as: Communication with other employees, Communication with superiors, Tasks, Work schedule, Limitations in career development, Risks of illness/injury, Inappropriate environment, Verbal aggression towards oneself, Gossip circles about oneself, Verbal aggression or gossip circles towards other employees; Verbal aggression from other employees; Verbal aggression from children; Verbal aggression from children's parents; Difficult collaboration with children's parents; Difficult collaboration with children. Although in each kindergarten the number of respondents is relatively small, in each of them the score of the "Use of emotional support" scale correlates positively, significantly with that of the "Use of instrumental support" scale (p=0.039; p=0.006 and p=0.010), and the stressor "gossip circles about oneself" is negatively correlated with the scale score (Brief Cope) "Positive reframing" (p=0.013; p=0.049; p=0.046). The whole group of respondents evinced significant correlations that indicate the type of coping depending on the occupational stressor or the studied variable, of which we mention:*
- *The stressor "Difficult collaboration with children" correlates positively with Behavioural disengagement (p=0.006) and Self-blame (p=0.002) scales;*
- *Difficult collaboration with parents is positively associated with Behavioural disengagement (p=0.003);*
- *Children's verbal aggression is positively associated with Behavioural disengagement (p=0.012) and negatively with Positive reframing (p=0.036);*
- *Communication with superiors' correlates positively with Behavioural disengagement (p=0.049) and Venting (p=0.046);*

*The correlations between the Brief cope scales and the studied variables show the importance of both coping evaluation and approach at individual and organizational level due to the multitude of factors involved. As the results of this study demonstrate, knowledge of the organizational environment, more precisely the employees' coping with stressors, is all-important.*

*Keywords: cope scales, locus of control, occupational stressors*

## Introduction

A wide range of stressors has been identified in the field of education, which can negatively influence job satisfaction, optimal workplace adaptation, performance and efficiency of education employees, with multiple unfavourable consequences for both the employees and the educational process. Hence, the importance of identifying and fighting against these stressors. Brief-COPE is a tool designed to assess various ways of coping that people use when facing stressors. Within this tool, the scales that also represent the methods of active coping or coping focused on problem solving are: Planning, Active coping, use of emotional support, and Use of instrumental support. The scales that measure the use of methods for fighting against situations perceived as uncontrollable, or emotion-focused methods are the following: Positive reframing, Humour, Acceptance, Religion, Self-distraction, Denial, Substance use.

Venting, Behavioural disengagement, and Self-blame are considered ineffective coping methods [1]. People with an internal locus of control consider that their actions determine the obtained results while those with an external locus of control consider that the results of their actions are not actually the consequence of their own way of action.

Knowledge and proper use of stressor-coping methods can increase the perceived self-efficacy without influencing the control locus measured by the Rotter scale. [2]

## Material and Method

The questionnaire administered to the employees from the 3 educational units included the following items:
- demographics (age, gender, type of residence, level of education, and income). The level of education had 4 answer options, from vocational school (number 1), to higher education (number 4). Income level compared to other people you know had 3 response options (corresponding to scores between 1 and 3);

16 occupational stressors:
- general: Communication with other employees, Communication with superiors, Tasks, Work schedule, Risks of illness/injury, inappropriate environment [3];
- frequent in education: Limitations in career development, Verbal aggression towards oneself, Verbal aggression from other employees; Verbal aggression from children; Verbal aggression from children's parents; Difficult collaboration with children's parents; Difficult collaboration with children [4];
- stressors most probable to appear in occupational groups: Gossip circles about oneself, Verbal aggression or gossip circles towards other employees;
- locus of control questionnaire [5];
- Maslach burnout inventory [6];
- perceived self-efficacy scale [7];
- Work ability index (WAI) [8].

The software package IBM SPSS Statistics v.20 was used for statistical processing, the Spearman correlation coefficient being considered significant at a minimum probability threshold, $p=0.05$.

## Results and Discussion

Of the total 87 employees, 75 agreed to fill in and returned the questionnaires. Only 11 of the respondents had a rural residence and only 3 were males. In the whole group

of respondents, over 4/5 had low and only 1/7 had average burnout scores. The distribution of employees who did not participate in filling in the questionnaires according to the school is as follows:

- in Kindergarten no. 1, five employees out of a total of 22 did not participate,
- in Kindergarten no. 2, three employees out of 37 did not want to participate,
- in Kindergarten no. 3, four employees out of 28 preferred not to get involved in this evaluation.

In each of the 3 kindergartens, the number of female employees is higher than that of male employees. In all 3 kindergartens employees mainly present low levels of emotional burnout and relatively high levels of self-efficacy and education, as well as of their perception on work capacity. The mentioned variables are not normally distributed in each school unit taken separately (Table 1).

*Table 1. Characteristics of the studied variables according to kindergarten*

| School unit | | type of residence | Self-efficacy | Age | Locus of control | WAI | Burnout | income compared to acquaintances | level of education |
|---|---|---|---|---|---|---|---|---|---|
| Kinergarten no. 1 | Mean | 2.00 | 30.40 | 47.53 | 71.92 | 40.33 | 45.25 | 1.92 | 3.00 |
| | N | 15 | 15 | 15 | 13 | 9 | 12 | 12 | 13 |
| | Minimum | 2 | 19 | 36 | 30 | 31 | 30 | 1 | 1 |
| | Maximum | 2 | 39 | 61 | 90 | 48 | 62 | 3 | 4 |
| Kinergarten no. 2 | Mean | 1.83 | 32.00 | 39.71 | 72.67 | 44.57 | 43.04 | 1.97 | 3.03 |
| | N | 35 | 31 | 35 | 30 | 28 | 27 | 32 | 32 |
| | Minimum | 1 | 26 | 25 | 25 | 34 | 33 | 1 | 1 |
| | Maximum | 2 | 40 | 62 | 90 | 49 | 70 | 3 | 4 |
| Kinergarten no. 3 | Mean | 1.80 | 32.85 | 39.76 | 77.00 | 43.55 | 44.38 | 2.10 | 3.00 |
| | N | 25 | 26 | 25 | 25 | 22 | 24 | 21 | 20 |
| | Minimum | 1 | 26 | 20 | 50 | 32 | 35 | 2 | 1 |
| | Maximum | 2 | 40 | 60 | 90 | 49 | 60 | 3 | 4 |

However, these variables do not show significant differences among the 3 educational units.

WAI had good and very good values in over 4/5 of the respondents, the rest of respondents having average values. In the total group of employees in the 3 kindergartens, women versus men use venting as a means of coping (expression of emotions) to a significantly larger extent than men ($p=0.015$) while in men rather than women, substance abuse is a preferred coping method ($p<0.001$), these representing the only statistically clear differences of the studied variables according to gender in the whole group (Table 2).

*Table 2. Characteristics of the studied variables according to gender*

| gender | | type of residence | Self-efficacy | Age | Locus Of control | WAI | Burnout | income compared to acquaintances | level of education |
|---|---|---|---|---|---|---|---|---|---|
| male | Mean | 1.67 | 32.00 | 50.67 | 76.67 | 47.00 | 43.00 | 2.00 | 2.00 |
| | N | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| | Minimum | 1 | 29 | 45 | 70 | 47 | 34 | 2 | 2 |
| | Maximum | 2 | 36 | 55 | 90 | 47 | 49 | 2 | 2 |
| female | Mean | 1.86 | 31.97 | 40.90 | 74.00 | 43.48 | 44.02 | 2.00 | 3.06 |
| | N | 72 | 69 | 72 | 65 | 58 | 60 | 62 | 62 |
| | Minimum | 1 | 19 | 20 | 25 | 31 | 30 | 1 | 1 |
| | Maximum | 2 | 40 | 62 | 90 | 49 | 70 | 3 | 4 |

There are no similar significant correlations in the 3 educational units in the locus of control score. Despite the small number of respondents in each kindergarten, the score of the scale "Use of emotional support" correlates positively, significantly with that of the scale "Use of instrumental support" (with p=0.039; p=0.006 and p=0.010 respectively) in each kindergarten, while the stressor "gossip circles regarding one's own person" is negatively associated with the score of the "Positive reframing" coping scale (p=0.013; p=0.049; p=0.046).

The two modes of active support coping (Use of emotional support and Use of instrumental support) are frequently associated. A less studied stressor in the occupational environment yet addressed in the present study is "gossip circles about oneself", which certainly requires further evaluation. Since it correlates negatively with "Positive reframing" and thus impacting both the individual and through its potential for maintenance and amplification, the organization itself, the stressor "gossip circles about oneself" requires adequate measures for effective approach and prevention.

- The level of education correlates positively with the Positive reframing scale (p=0.010). Employees with higher education prefer less active resolution of stressors in the occupational environment, preferring a possible less conflictive coping, based on emotion and a positive reinterpretation of stressful situations.
- The stressor "Difficult collaboration with students" correlates positively with Behavioural disengagement (p=0.006) and Self-blame (p=0.002) scales.
- Difficult collaboration with parents is positively associated with Behavioural disengagement (p=0.003)
- verbal aggression from children is positively associated with Behavioural disengagement (p=0.012) and negatively with Positive reframing (p=0.036)
- Communication with superiors' correlates positively with Behavioural disengagement (p=0.049) and Venting (p=0.046)
- gossip circles regarding one's own person correlates positively with Behavioural disengagement (p=0.011) and negatively with Positive reframing (p=0.000), and Humour (p=0.002).

## Conclusions

Gossip that targets individuals in organizations leaves no room for positive interpretations, thus being able to trigger in the long run, at organizational level, secondary stressors aimed primarily at communication and collegiality among employees.

The results of this study show that Behavioural disengagement, self-blame, and venting, considered as inefficient ways of coping are used mainly by employees in the 3 kindergartens in dealing with the following stressors: Difficult collaboration with parents, Children's verbal aggression, Difficult collaboration with children, Communication with superiors.

The importance of effective management of these stressors that are directly related to the didactic activity consequences, imposes application of strategies that will change these employees' coping methods, especially since communication with parents and children as well as the response to children's verbal aggression are essential elements for the success of the entire educational process, first and foremost in preschool education.

The correlations between the Brief cope scales and the studied variables, of which several were mentioned herein, show the importance of coping evaluation at both individual and organizational level, but also the knowledge of the organizational climate from the perspective of studied variables, as underlined by the current results.

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# Correlations of Emotional Burnout with Self-Efficacy, Quality of Life, and Work Ability in Pre-University Employees

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## Abstract

*During the routine medical check-up, employees from 3 high schools voluntarily filled in a questionnaire that traced the emotional burnout (Maslach burnout inventory), perceived self-efficacy (self-efficacy scale), dimensions of the quality of life (Short Form 36 questionnaire-SF36), work ability (Work ability index-WAI), together with demographics (age, seniority as an employee in the unit, gender, type of residence, level of education, and income), and 10 occupational stressors. Out of a total of 392 employees, 62.2% filled in the questionnaire. 76.63% of the respondents had low scores and 22.95% average scores of the burnout syndrome. In each of the 3 high schools, the perceived self-efficacy correlated significantly negatively with the burnout score for the entire group of respondents (p=0.006; p=0.009; and p<0.001). In all 3 high schools, the burnout score correlated significantly negatively with the following dimensions of the quality of life: physical functioning, physical role functioning, emotional role functioning, vitality, mental health, social role functioning, general health perceptions. The burnout score correlated significantly positively in all the 3 high schools with 7 occupational stressors: impossibility of changing the unpleasant aspects at the work place, earnings, increased responsibility of the job, risk of illness and injury at work, communication with other employees, tasks, and work schedule. The association of perceived self-efficacy in each high school only for groups with low burnout scores and the lack of this association in groups with average burnout scores, as well as different associations depending on the school unit among the studied variables, shows the complexity of individual and organizational factors involved, but also their importance. Early diagnosis of emotional burnout is crucial as underlined by the significant negative association of the burnout score in all the 3 high schools with both the dimensions of the quality of life and perceived self-efficacy as well as with most of the studied occupational stressors.*

*Keywords: burnout, work-ability, self-efficacy, occupational stressors*

## Introduction

Among the host of occupational stressors, the following are well known: leadership style, interpersonal relationships at work, workplace design (which can generate risks of illness or injury), work tasks and work schedule [1]. Besides these, a stressor not to be

overlooked in the field of education is that of excessive paperwork [2]. Likewise, workers with higher wages tend to have greater autonomy in relation to the workplace and this autonomy is associated with a better perception of health [3]. Autonomy in the workplace also covers decision-making issues, such as the possibility of modifying or optimizing unpleasant aspects of the workplace. The burnout syndrome occurs frequently in education, especially in people who are highly involved and who have an increased sense of accountability, with consequences for the quality of their lives through its dimensions: emotional, social, and overall health.

Employees' perceptions of work capacity may be influenced by stress at work, and individual characteristics [4]. The level of perceived self-efficacy can differentiate on how individuals relate to stressors. People with low self-efficacy are more likely to believe that their effort does not bring any contribution to the success or accomplishment of an activity [5].

**Material and Method**

During the regular medical check-up, the employees from three high schools were administered a questionnaire for voluntary completion, which included the following items:

- employees' individual characteristics (age, seniority as an employee in the unit, gender, type of residence, level of education, and income). The level of education had 4 answer options, from vocational school (number 1), to higher education (number 4). Income level per family member also had 4 response options (corresponding to scores between 1 and 4);
- the ten occupational stressors under study are presented in Table 1 below. Occupational stressors were scored on a Likert scale frequency from (1) to (4);

*Table 1. Possible causes of stress for the workers*

| Nr. | Occupational stressor |
| --- | --- |
| 1 | Impossibility of changing unpleasant aspects in the workplace |
| 2 | Communication with and support from superiors |
| 3 | Workplace-specific increased responsibility |
| 4 | Risks of professional diseases are present in the workplace |
| 5 | Income level |
| 6 | Risks of hazards in the workplace |
| 7 | Type of communication and/or relationships (conflicts) with other employees |
| 8 | Work tasks |
| 9 | Work schedule |
| 10 | Need to fill in daily activity records/other forms |

- emotional burnout was measured through the Maslach burnout inventory [6];
- dimensions of quality of life (Short Form 36 questionnaire-SF36) [7];
- General self-efficacy scale [8];
- Work Ability Index (WAI) [9].

The Spearman correlation coefficient was used at a minimum probability threshold, $p=0.05$ while for statistical processing we employed the IBM SPSS Statistics v.20 software package.

**Results**

The three high schools had a total number of 392 employees as follows: High school no. 1-158 employees, high school no. 2-103 employees, and high school no. 3-131 employees. Of these, 62.2% participated in the study, returning the filled in questionnaires.

In all the three high schools, the number of female employees was significantly higher than that of the male employees, most employees having higher education degrees.

Most of the employees in the three high schools were also in their middle adulthood, with good, over 10 years' mean seniority in the work place (Table 2).

*Table 2. Characteristics of respondents in the three school units*

|  | Gender |  | "income/family member" | Age | Seniority in the unit | Education level |
|---|---|---|---|---|---|---|
| Highschool no. 1 | Male | Mean | 2.25 | 42.88 | 17.00 | 3.89 |
|  |  | N | 12 | 16 | 12 | 18 |
|  |  | Minimum | 2 | 21 | 2 | 2 |
|  |  | Maximum | 4 | 65 | 40 | 4 |
|  | Female | Mean | 2.08 | 41.15 | 11.73 | 3.97 |
|  |  | N | 64 | 73 | 67 | 74 |
|  |  | Minimum | 1 | 23 |  | 2 |
|  |  | Maximum | 3 | 69 | 41 | 4 |
| Highschool no. 2 | Male | Mean | 2.00 | 47.06 | 16.76 | 3.88 |
|  |  | N | 17 | 17 | 17 | 17 |
|  |  | Minimum | 1 | 26 | 2 | 3 |
|  |  | Maximum | 3 | 61 | 43 | 4 |
|  | Female | Mean | 2.20 | 41.46 | 12.95 | 3.98 |
|  |  | N | 40 | 41 | 41 | 40 |
|  |  | Minimum | 1 | 25 | 1 | 3 |
|  |  | Maximum | 3 | 58 | 29 | 4 |
| Highschool no. 3 | Male | Mean | 2.00 | 50.10 | 17.25 | 3.20 |
|  |  | N | 18 | 20 | 20 | 20 |
|  |  | Minimum | 1 | 23 | 1 | 1 |
|  |  | Maximum | 3 | 65 | 42 | 4 |
|  | Female | Mean | 1.93 | 44.38 | 14.37 | 3.43 |
|  |  | N | 75 | 79 | 73 | 76 |
|  |  | Minimum | 1 | 22 | 1 | 1 |
|  |  | Maximum | 3 | 60 | 38 | 4 |

In terms of gender, there were significant differences in the 3 high schools according to the studied variables:
- In High School no. 1 the stressor "impossibility to get involved in changing the unpleasant aspects at work" has a higher level in female versus male employees (p=0.004)
- In High School no. 2 the stressor "impossibility to get involved in changing unpleasant aspects at work" is a higher stressor in male versus female employees (p=0.029) while the "role of physical functionality" has higher scores in female versus male employees (p=0.049)

In High School No. 3, males are older compared to female employees (p=0.024).

In all the three high schools, there are no significant differences in the scores of emotional burnouts, perceived self-efficacy, the dimensions of quality of life, and work capacity according to the type of residence, age, "seniority in education", "income

level/family member", level of education.

Comparing the results obtained in the three high schools, we noticed the following significant differences:

- *Age* is significantly different, with the highest value in employees from Highschool no. 3 compared to employees in Highschool no. 1, the latter having the lowest value (Kruskal Wallis test, p=0.03);
- *Seniority in education* is highest in Highschool no. 3 and lowest in Highschool no. 1 (p=0.023);
- *Physical functionality* has the highest values in Highschool no. 1 and the lowest in Highschool no. 3 (p<0.001);
- *Pain* as quality of life dimension has the highest values in Highschool no 1 and the lowest in Highschool no. 3;
- *General state of health* as quality of life dimension has the highest values in Highschool no. 1 and the lowest in Highschool no. 3 (p=0.002).

It should be noted that the perceived self-efficacy, the level of emotional burnout, the scores of the other dimensions of life quality, as well as the WAI score are without significant differences in the three high schools. In what follows, presentation of the probability threshold will be made in the following order: high school no. 1, high school no. 2, high school no. 3.

For those who presented low burnout scores, these scores correlated significantly negatively with the perceived self-efficacy in all 3 high schools (p=0.014, p<0.001, p<0.001), and with WAI only in two of the three surveyed high schools. There were no significant correlations between the burnout scores and perceived self-efficacy or WAI in employees with average burnout scores in any of the 3 high schools.

In all the three high schools, age correlates positively with seniority as an employee in the unit (all with p<0.001), whereas the burnout score correlates significantly negatively with the following dimensions of the quality of life:

- physical functioning: p=0.002, p<0.001, p=0.017;
- physical role functioning: p=0.011, p=0.021 p=0.001;
- emotional role functioning: p=0.045, p=0.007, p=0.027;
- vitality: p<0.001, p<0.001, p<0.001;
- mental health: p<0.001, p<0.001, p<0.001;
- social role functioning: p=0.001, p<0.001, p=0.002;
- general health perceptions: p=0. 012, p<0.001, p=0.007.

The burnout score correlates significantly positively in all the three high schools with the following 7 occupational stressors:

- earnings: p=0. 005, p<0.001, p=0.049;
- increased responsibility of the position: p=0.012, p=0.016, p<0.001;
- risk of sickness: p<0.001, p=0.004, p=0.01;
- risk of hazards is present in the job: p<0.001, p=0.008, p=0.003;
- communication with the other employees: p=0.02, p=0.001, p<0.001;
- work tasks: p=0.008, p=0.003, p<0.001;
- work schedule: p<0.001, p=0.027, p<0.001.

The burnout score correlates significantly negatively in all the three high schools with the perceived self-efficacy p=0.006, p=0.009, p<0.001.

## Conclusions

The importance and complexity of individual and organizational factors involved in the interconnections between burnout and the other variables in the current study is

underlined by the association of perceived self-efficacy in each high school only for groups with low burnout scores and the lack of this association in groups with average burnout scores, as well as different associations among the studied variables depending on the school unit.

Likewise, the significant negative association of the burnout score in all the three high schools with both the dimensions of the quality of life and perceived self-efficacy, as well as with most of the studied occupational stressors demonstrate that the early diagnosis of emotional burnout is crucial.

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# Education on Prevention of Burn Injuries

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## Abstract

*Burns are a major global problem for public health. A number of risk factors, such as social, economic, educational, cultural, environmental and occupational conditions, and lifestyle can affect the lives of victims, their families and the whole society. Many of the World Health Organization's programs and international scientific societies are focused on education and preventing risk factors that endanger people's lives and health. Activities in the field of prevention and care of burn injuries aim to follow the public health approach and thus to address gaps and inequalities among people with low and middle income. The paper draws attention to the importance of the problem about education and prevention of burn injuries. The impact of education on the reduction of incidents has been proven globally. Positive change in burn injuries is reported not in the increased survival rate due to modern treatment methods, but in the significant drop in the incidence of burn injuries. Despite the opinion of some researchers (Ahn C.S. & Maitz P.K.M., 2012) that 90% of all burns are preventable, they remain a common and major public health problem [1]. In developed countries, particular attention is paid to legislation, public awareness, education and trauma prevention campaigns, as well as the health and safety directives [1]. Legislative and societal initiatives contribute to reducing the incidence of burns (primary prophylaxis), severity of trauma (secondary prophylaxis) and complications of the disease (tertiary prevention) [3]. Keswani, MH (1986) noted that "challenges to Burns... are not found in 100% successful treatment, but in 100% injury prevention" [5]. In conclusion globally, particular attention is paid to education, public awareness and trauma prevention campaigns, which have been shown to contribute to reducing the incidence of burns and the severity of trauma. The guidelines for raising the health culture of the population are associated primarily with the increasing frequency and importance of the main risk factors of the social environment.*

*Keywords: Education, Prevention, burn injuries, raising awareness*

## 1. Introduction

Burn injuries cover a wide range of injuries to the health and lives of victims. They can cause severe general illness caused by local skin lesions affecting all organs and systems of the human body. Due to damage to the skin and other organs, burns can lead to open wounds, injury, death, major economic consequences, and severe emotional and psychological complications for the victims. Patients with burns go through a long and difficult period, covering not only long and expensive treatment, but also subsequent rehabilitation, reconstruction and long-term therapy to correct the scars.

Despite the opinion of some researchers (Ahn C.S. & Maitz P.K.M., 2012) that 90% of all burns are preventable, they remain common and a major public health problem [1].

In South Africa, burns are the third most common cause of accidental deaths among

children under 14. According to statistics from the Red Cross incineration department, 650 to 900 injured children of different ages are admitted to a specialized children's hospital in just one year (Albertyn R, Bickler SW & Rode H., 2006) [2]. It is stated that children under 5 years of age are the most endangered age group, and 50% of all burns are observed in children under 2 years of age. The main cause of burns in them are burns from hot liquids. Fire causes only 13% of burns, but is the cause of 83% of deaths (Rode H, *et al.*, 1989) [4].

In the countries of Southeast Asia, most of the victims of burns are in the working age group between 15-60 years. Flame burns are the most common cause of injuries, followed by sunburn, which is common in children. The average hospital stay of patients varies from 13 to 60 days, and the mortality rate is from 4.5 to 23.5%, with the highest relative share of patients with flame burns. Although burns are one of the leading causes of morbidity and mortality, in most cases there is a lack of effective intervention programs due to limited epidemiological data. In developed countries, the frequency of casualties is significantly reduced due to the introduction of effective prevention intervention programs.

In the United States, burns are the third leading cause of death from fires and the second leading cause of injury in adults over the age of 70. Burns in the elderly lead to a significant increase in morbidity, prolonged hospital stays, and long-term psychological trauma is often reported (Stockhausen AL, Katcher ML., 2001) [6]. The annual cost of treating burns is $ 7.5 billion (Corso P, *et al.*, 2015) [7].

## 2. Promotion of Injuries

Injuries and poisonings are one of the leading causes of death, both in the world and in Bulgaria (third place), due to their high frequency among young and middle-aged groups. They are a broad category of health damage, including road accidents, burns, poisonings, suicides, homicides and violence at home and abroad. This type of health damage is a leading cause of loss of potential years of life and is becoming a major focus of society and public health.

According to the National Statistical Institute (Health, 2018), there is an increase in hospitalized patients in all age groups with class XIX diseases "Trauma, poisoning and some other consequences of the impact of external causes", incl. Thermal and chemical burns on the outer surface of the body, specified by their location.

Burn injuries are a major global public health problem. A number of risk factors, such as social, economic, cultural, environmental and working conditions, lifestyle can affect the lives of victims, their families and society as a whole, which determines their social significance.

Health promotion is a unifying concept, including decision-making and measures to change and improve certain factors affecting health with the participation of both the individual and society as a whole, to achieve full compliance between the environment and health. It is related to the philosophy of "health for the healthy" and outlines several basic principles:

- targeted actions to eliminate risk factors;
- support of the factors leading to better health of the population;
- support for appropriate health, social and environmental policies;
- development of social responsibility for health;
- strengthening personal responsibility and developing personal skills;
- reorientation of the health service towards health promotion;
- inter-institutional interaction;

- close interaction with business;
- supporting the participation of health professionals in health education and support [3].

The theoretical model of health promotion includes several elements:

1. Health education – a purposeful method for creating positive personal behaviour and supporting the individual, group and society as a whole, by acquiring the necessary information for the development of positive health characteristics, health motivation and affirmation of positive health habits and life skills.
2. Health protection – a set of measures aimed at increasing positive health and creating a healthy living environment.
3. Health prevention – covering all measures taken by health professionals and society to prevent the spread of risk factors and diseases and their complications among the population.

In modern societies, a number of risk factors, such as socio-economic, cultural, environmental and working conditions, lifestyle can provoke disease, whether or not there is a predisposition to it. In order to create real conditions for a healthy lifestyle among the whole population, the actions of doctors, health care professionals, psychologists, pedagogues, social workers, politicians and others must be coordinated.

Their main function is to organize effective comprehensive health promotion programs based on broad public support. An important role in this direction is played by the direct involvement and participation of the family and the school environment of adolescents [8].

An individual's behaviour can have a positive or negative impact on health. A number of health risk factors stem from the psychology, behaviour and relationships of the individual in modern society. These factors are related to:

- the cultural context – traditions, beliefs, moral norms, psychosocial resources for dealing with stressful situations in everyday life;
- lifestyle – primarily in the family with a focus on life events and social support;
- the individual psychological state – the internal resources of the person to deal with life stressful situations, risky forms of behaviour [3].

The concept of risk factors should be the basis of preventive activities under the programs, with a leading population approach to intervention, but also with the application of a high-risk approach. The population approach aims to reduce the level of risk factors for all persons by creating a favourable environment that allows a healthy lifestyle through a number of measures, such as changes in legislation, taxes, financial incentives from the government and others. It has a negligible effect on individuals, but significant at the population level, does not require behavioural changes, is relatively fast and is cost-effective, i.e., leads to "benefits for all". The high-risk approach is aimed at detecting and treating high-risk individuals. Requires behavioural changes at the individual level, leads to a significant effect on individuals, but has little effect at the population level, i.e., leads to "benefits for some" [3].

According to Rose (1981), many preventable cases occur not in small, high-risk groups, but in large, relatively low-risk groups. The population approach to disease promotion can lead to a significant change in the main health indicators – morbidity and mortality. This approach provides:

- ✓ good knowledge of the facts;
- ✓ study of the causes (risk factors) for the occurrence of chronic non-communicable diseases;
- ✓ choice of interventions – setting goals and objectives, health strategies, programs, priorities;

✓  assessment of the costs and effectiveness of the intervention.

Health promotion aims to create opportunities for people to improve their health by self-regulating their health behaviour. It is aimed at creating a healthy lifestyle, which is a consequence of the high health culture of adolescents and the population in each country.

Child trauma is typical for children and adolescents up to 14 years. This is a period of rapid changes in physical and emotional development, as well as in the behaviour of adolescents. Priority attention in the school environment deserves comprehensive programs for health promotion and the formation of a healthy lifestyle [3].

In the medical and social problems of the third age, the key place is occupied by the measures against the factors of social and psychological nature, limiting the independence of the elderly. One of the priority tasks for ensuring a quality life for the elderly is the improvement of the methods for health-promotional activity with a focus on prevention of falls and injuries, as well as increasing the opportunities for self-care in this age category.

## 3. Burns Prevention

Various researchers point out that burns are among the most devastating of all injuries and represent a major global public health problem [2, 7, 9-11]. In our modern society, burns are everyday at home, in the professional and school environment, but information about the extent of trauma and research on the ethiology and characteristics of burns in different age groups are insufficient [3, 5, 11].

Burn injuries affect the life of the victim, his family and the whole society, which outlines their medical, social and economic significance. Activities in the field of prevention and care for burns are aimed at following the approach of public health and thus try to overcome the gaps and inequalities worldwide.

The International Society for Burns Injuries (ISBI), founded in 1965 in Edinburgh, Scotland, is working to reduce the incidence of this severe trauma by proposing strategies to improve treatment while training. Today, the organization has more than 100 members and more than 2,000 members, including from Bulgaria with various specialties related to the treatment of this trauma [8].

A number of studies worldwide have shown that over the last 30 years, a significant change in burn care has not been an increase in survival due to modern treatments, but a significant drop in the incidence of accidents. In developed countries, special attention is paid to legislation, public awareness, injury prevention campaigns and health and safety directives [9]. Legislative and public initiatives contribute to reducing the frequency of burns (primary prevention), the severity of trauma (secondary prevention) and complications of the disease (tertiary prevention) [12].

Keswani, MH (1986) notes that "the challenges of burns do not have 100% successful treatment, but in 100% injury prevention is successful" [5].

The World Health Organization (2017) called on leading burn experts from around the world to guide the further development of the Burn Prevention Program and provide guidance to address these challenges. The first consultation meeting on burn prevention and care allowed the use of the knowledge of many specialists, as well as the collective expertise of international organizations such as the International Society for Burns Injuries (ISBI) in developing its 10-year plan for prevention and care burning.

The WHO points out the main shortcomings in the prevention and care of burns in several areas:

➢  limited awareness of the problem among the population and especially among politicians in the countries;

> ➢ limited implementation or lack of policies to address the problem of burns;
> ➢ data on the extent of the problem, the risk factors and the economic consequences of the problem are missing or in some places insufficient and inaccurate;
> ➢ there are no studies on the severity and risk factors for burns in the circumstances of low- and middle-income countries, as well as in relation to the assessment of intervention trials or the cost-effectiveness of prevention and care strategies;
> ➢ Inadequate application of known, effective prevention strategies, such as smoke detectors and temperature control of the hot water heater, in an environment in which they are likely to be effective;
> ➢ Insufficient scientific assessment of strategies to counteract the risk factors causing burns in low-income countries;
> ➢ In many low- and middle-income countries, the implementation of effective burn care, including rehabilitation and long-term rehabilitation of burn victims, is insufficient;
> ➢ limited resources, lack of sufficiently trained staff with the skills needed to undertake the mentioned range of combustion control activities.

The large-scale strategic plan aims to support countries' efforts to prevent trauma worldwide. A number of special projects and activities include the development of various training materials (TEACH-VIP training modules cover burn prevention), as well as a number of publications addressing the problem (burn data sheet). Some of the manuals contain information on burns, including Guidelines for the Monitoring of Injuries [13] and Guidelines for Emergency Care of Injuries [14] and others.

## 4. Results

A study (A. Dimitrova, 2019) aimed at establishing the level of awareness of parents and students regarding risk factors, the level of severity and the impact of health education on trauma prevention found that the studied groups are informed about the risk factors of the surrounding environment and assess the seriousness of the threat to their life and health.

The results show that 75.82% of parents (n=91) and 78.02% of students (n=93) assess the severity of the impact of trauma on the health and lives of victims, for 95.60% of parents and 96, 70% of students providing information about the risk to adolescents will reduce accidents, for 96.70% of parents conducting health education in the school environment will reduce the risk of trauma, and 81.72% of students are willing to participate in forthcoming health training on the topic [8].

The experience of advanced countries shows that the most effective for injury prevention are complex programs aimed at change in people, change in specialists, change in the living environment [7, 11].

A sociological survey (Dimitrova, A., 2019) [8] was conducted among 288 health care specialists, of which 134 are working in outpatient care structures and 154 nurses from school and child health aimed at establishing the level of awareness regarding risk factors, the level of severity of the burn and the impact of health training aimed at injury prevention. The results found that for 82.98% of the surveyed persons it is necessary to provide information to the population about the possible causes and risk factors, and 84.38% of them expect the provided information to influence the reduction of incidents.

According to 89.24% of the respondents (n=288) conducting health education in the school environment on the topic of electric burns will contribute to the prevention of trauma among adolescents.

Effective burn prevention programs begin with an accurate assessment of the frequency of trauma, through situational analysis and extrapolation studies, which in itself requires an extremely expensive resource.

There is no information in our country about introduced programs for burn prevention.

Health education programs for children and adolescents are determined and set by the Ministry of Education and the Ministry of Health. They lack the topic of burn prevention, although thermal and electrical burns are common in these age groups.

Various serious incidents with teenagers affected by high-voltage burns are discussed in the public space, but the institutions lack specific guidelines for prevention [8].

## 5. Discussion

Following the example of developed countries, legislative and public initiatives should be engaged to collect data, conduct research and develop appropriate interventions to promote trauma, strengthen prevention, prevention and effectiveness of burn care. The development of multidisciplinary national strategic plans, including regulatory measures and guidelines to prevent and reduce the incidence of burns, should be encouraged, such as:

- information brochures/flyers with recommendations for burn prevention;
- health education programs for children and adolescents including basic ones
- knowledge of burns depending on the age of adolescents;
- use of safe heating systems;
- working electrical appliances;
- refractory toys;
- standards for electrification;
- smoke detectors in residential and public buildings;
- opening the doors to the outside, etc. [3].

Prevention strategies should be aimed at awareness of the prevention of accidents at work with flammable materials, compliance with fire safety measures, knowledge of evacuation plans in the event of a fire in a building and others.

## 6. Conclusion

Globally, special attention is paid to public awareness and injury prevention campaigns, which have been shown to contribute to reducing the frequency of burns and the severity of injuries. The guidelines for raising the health culture of the population are primarily related to the increasing frequency and importance of the main risk factors of the social environment. The consequences of burn injuries are a leading cause of loss of potential years of life, making them a major focus of public health.

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# Nurses' Professional Behaviour in Aggression by the Patient

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## Abstract

*The socio-economic conditions, the widespread use of information technology, urbanization and stress in modern society are the determinants of the human mental state. Problems related to the protection and restoration of mental health disorders are especially relevant in the modern world. The psychic phenomenon called emotion is related to the instincts, needs and motives of the person. These are experiences that occur at a given moment, which are defined as the subjective coloration of internal experiences of satisfaction or dissatisfaction. They are influenced by various factors such as age, gender, temperament, life experience, upbringing, environmental impact, health, irritants and others [1, 2]. The reasons for a person's aggressive behaviour are diverse – biological, psychological, ethological, social. According to the World Health Organization, aggression is based on individual, social, cultural and environmental factors [4]. Aggression and violence are among the most challenging aspects of clinical practice for nurses in all situations. Any act or behaviour directed against another person or the person itself that causes physical, mental and emotional distress can be called violence. Violence is an anti-human act and is a type of crime and violates the dignity and interests of the individual [5]. The purpose of this study is to determine the awareness and ability of nurses to deal with aggressive behaviour on the part of the patient during hospital treatment. Experts' evaluation of the developed manual for professional behaviour of nurses in the case of aggressive behaviour by the patient was carried out. Material and methods. An anonymous survey was conducted among 200 nurses from 6 university hospitals in Sofia during 2018. Results and discussion. A leading factor in patients' aggressive behaviour is the disease process and the discrepancy between patient expectations and hospital reality. The most common forms of aggression are non-verbal and indirect, which are aimed at hurting and degrading the nurse's personality. Conclusion. Experts estimate that the developed manual on the professional behaviour of nurses in the face of aggressive patient behaviour is sufficiently informative and specific for staff to make adequate decisions in such situations.*

*Keywords: nurses, aggression, patient, professional behaviour*

## 1. Introduction

The causes of aggressive behaviour of a person are diverse – biological, psychological, ethological, social. According to the World Health Organization, aggression is based on individual, social, cultural and environmental factors. Aggression and violence are among the most challenging aspects of clinical practice for nurses in all situations. Any action or conduct directed against another person or one's own person that causes physical, mental, and emotional distress can be called violence. Violence is

an anti-humane act and is a type of crime and violates the dignity and interests of the individual. [9]. Nurses carrying out activities and care in structures such as emergency rooms, intensive care units, hospital departments often take care of people who respond with a violent and aggressive behaviour, which may pose a significant risk to themselves, to other patients and to healthcare professionals. In this way, prevention and management of behaviour are important skills, both for the nurse and for the students who are trained to assimilate the profession.

Staff surveys show that between 75% and 100% of medical staff in psychiatric units were attacked by a patient at a certain stage of his career. Between 2011 and 2013, workplace attacks ranged from 23 540 and 25 630 per year, with 70-74% happening in healthcare, and 27 of the 100 health deaths in 2013 were due to attacks and acts of violence in the United States. [5].

Since nurses spend a lot of time with patients, they have an impact on patients. It seems that when patients have a positive experience in nursing, nurses also have a good and healthy working environment. A healthy working environment creates a climate where nurses are challenged to use their experience, skills and clinical knowledge. In addition, nurses working in such an environment are encouraged to provide patients with excellent medical care.

Patient satisfaction is a definite indicator for evaluating and improving the quality of care. When healthcare organisations assess patient satisfaction, professionals can use the results for internal quality improvement. Specialists use the experience and preferences of patients to correct their own practice and to make visible their contribution to the results of patients. Aggression often occurs in situations where the patient's needs are not fully satisfied and anger and frustration occur. The emergence of aggression is associated with the complex interaction of intrapersonal and interpersonal factors.

The factors related to the social context of patients are: poverty, stressful life events and victimization. Interpersonal factors in combination with environmental stressors can contribute to the vulnerability of patients in aggressive reactions.

## 2. Aim of the Study

The purpose of this study is to establish the awareness and ability of nurses to deal with aggressive behaviour by the patient during hospital treatment. A handbook on the professional behaviour of nurses in aggressive behaviour on the part of the patient has been developed to enhance the professional competencies of nurses in hospital care in relation to strategies for coping with aggressiveness by the patient.

## 3. Material and Methods

An anonymous survey of 200 nurses from 6 University Hospitals in the city of Sofia was conducted in 2018. An expert evaluation of the developed Manual of professional behaviour of nurses on aggressive behaviour by the patient was carried out. The Expert Group is composed by 8 academics from Medical University-Sofia. The study was carried out within the framework of a project funded by the Medical Science Council of Medical University of Sofia for the year 2018.

## 4. Results

The results on the awareness of nurses from the University Hospitals in Sofia are presented at the following figure 1.
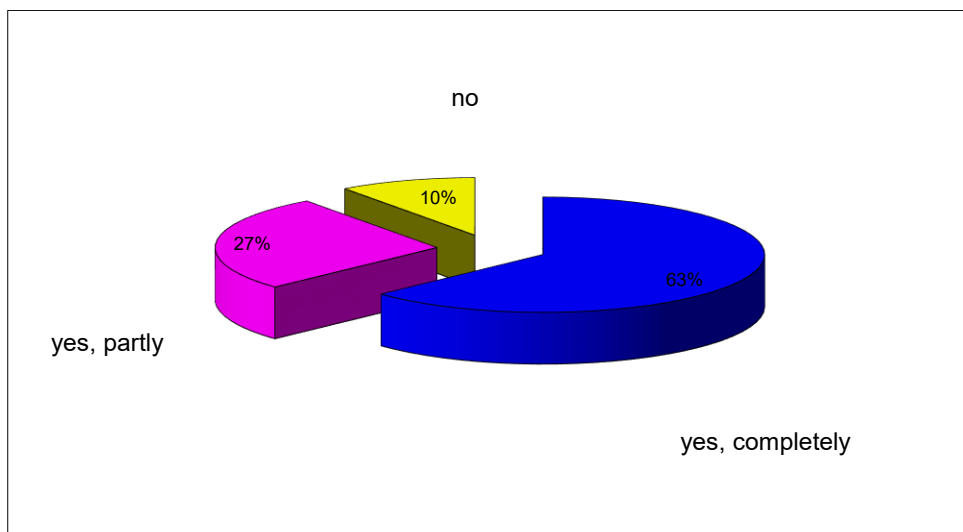
*Fig. 1. Awareness and understanding of the concept of "aggressive behaviour" by nurses*

More than half of the nurses (63.00%) respond positively to the question of knowledge of the notion of violence. "Yes, partly" indicate 27.00% and a negative response indicate 10.00%. According to the results obtained, it is clear that nurses have a need for training to be specifically aimed at studying aggressive behaviour.

The types and forms of aggression on the part of patients meeting nurses during their professional activities are presented on table 1.

*Table 1. Types and forms of aggression observed by nurses during their work*

| Types and forms of aggression | Yes, very often | Not very often | No |
|---|---|---|---|
| Self-aggression – self-harm, guilt and doom. | 17.00% | 63.00% | 20.00% |
| Physical aggression – direct physical attacks. | 19.50% | 67.00% | 13.50% |
| Verbal aggression – behaviour associated with humiliation, harm, insulting a person through shouting, threats and other verbal manifestations. | 39.00% | 32.50% | 28.50% |
| Non-verbal aggression – humiliating and hostile attitude. | 56.00% | 29.00% | 15.00% |
| Indirect aggression – spreading lies, slanders and gossips to injure the person. | 52.00% | 26.50% | 21.50% |

According to nurses, the most often observed in practice are non-verbal and indirect aggression. There is a significant relative share of respondents who indicate that verbal aggression is not observed in practice. This means that patients refrain from verbal aggression towards nurses in hospitals, but show the nurses a disrespectful attitude and attitude hurting the nurse's personality.

The extent to which nurses can identify signs of aggressive behaviour becomes clear from the following figure 2.
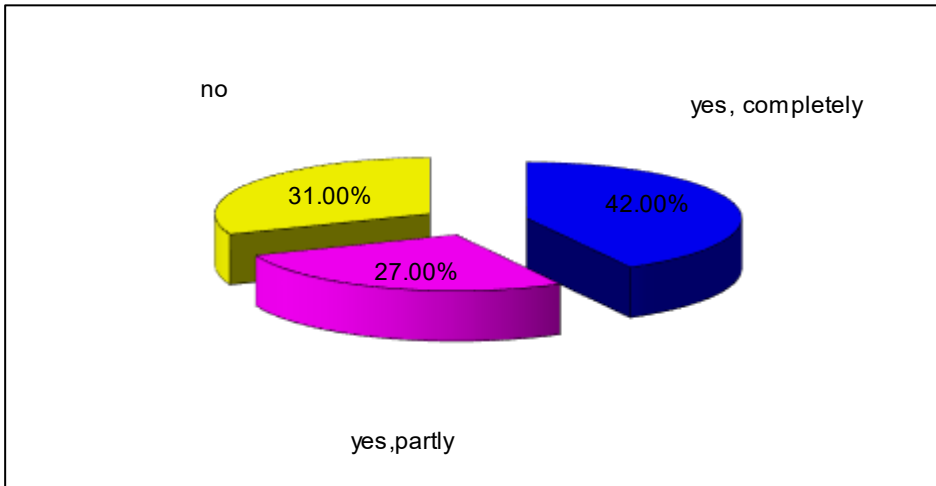


*Fig. 2. Competences for recognizing the signs of aggression on the part of the patient*

The largest relative share of nurses who believe they have the competences to recognize the signs of aggression on the part of a patient. Answer "Yes, partly" indicate 27.00%. A negative answer to the question gives 31.00%. These results show that nurses from university hospitals in Sofia need to improve their qualification to recognize the signs of aggression and to take appropriate professional decisions when such situations arise. Well trained and prepared nurses can use different strategies to deal with the patient's aggressive behaviour.

The results regarding the procedures introduced in the nursing practice for assessing the risk of aggression are presented on Fig. 3
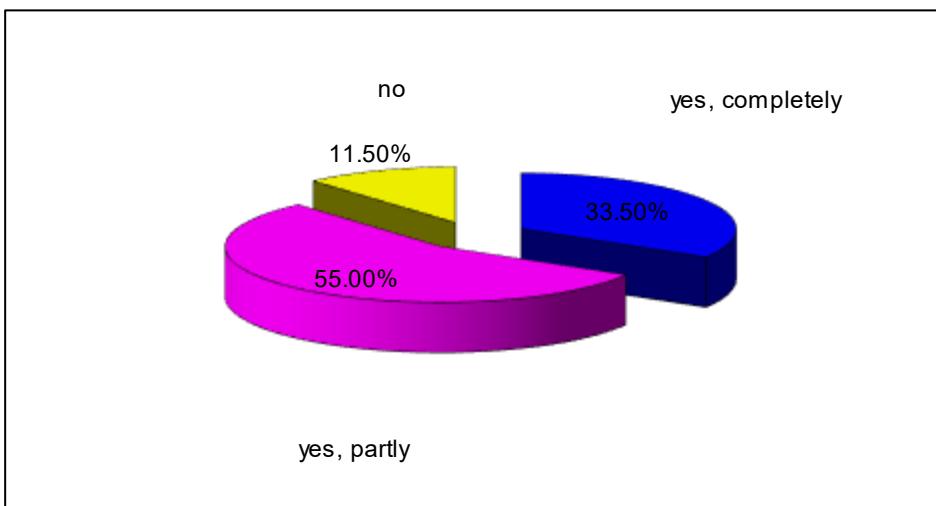


*Fig. 3. Introduced in practice procedures for risk assessment of aggression*

More than half of the nurses surveyed indicated that there were no procedures in place to assess the risk of aggression. A positive response to this question indicated 33.50% of respondents. It is necessary to introduce into the organisation of hospital structures procedures to enable staff to assess the risk of aggressive behaviour of patients.

The opinion of nurses regarding the main causes that provoke aggressive behaviour of patients is presented on table 2.

*Table 2. Main reasons provoking aggressive behaviour*

| Reasons | Yes, very often | Yes occasionally | No |
|---|---|---|---|
| Biological – hormonal, neurological, biochemical | 55.00% | 28.00% | 17.00% |
| Gender differences | 17.00% | 28.50% | 54.50% |
| Addictions – alcohol, drugs | 34.50% | 21.50% | 44.00% |
| Pain and discomfort | 39.50% | 29.00% | 31.50% |
| Discrepancy between the patient's expectations and the real facts | 49.00% | 27.00% | 24.00% |
| Anger, irritation and frustration | 43.50% | 34.50% | 22.00% |

According to nurses, the leading cause of aggressive behaviour of patients is the presence of health problems, as a result of violations of various organs and systems.

Secondly, the discrepancy between the expectations of the patient and the real facts is indicated by 49.00% of respondents and thirdly – 43.50% give an answer – anger, irritation and dissatisfaction of the patient from hospital stay. It is normal to expect aggressive behaviour on the part of the patient during hospital treatment, which is conditioned by development of pathological processes within the body and the requirements of hospital stay.

## 5. Discussion

The findings of potential violence requires the implementation of strategies such as communication strategies, which include: a calm appearance; to speak quietly; to speak in an impartial manner; to speak in a neutral and concrete way with an area between the nurse and the patient; to show respect for the patient; to avoid intense direct contact with the eyes; to demonstrate control of the situation without taking a too authoritarian position; to facilitate the patient's position; to listen to the patient; to avoid early interpretations; not making promises that cannot be respected. If the nurse communicates with an authoritarian, controlled or disrespectful manner, the patients are therefore angry and react with aggressive behaviour. [8].

Lyneham (2000) found that nurses, in their daily work, suffer insults, intimidation and aggression, usually from patients and/or their relatives [3]. Nurses face not only verbal aggression, but also an imminent threat of physical abuse, which is a prerequisite for developing emotional responses such as anger, anxiety, helplessness, sadness and depression [6], [7].

All this determines the need for training providing professional skills for an adequate response to health care professionals in situations of aggressive behaviour. To assist the nurses in coping with aggressive behaviour, the "Handbook of Professional behaviour of the nurse in the situation of aggression on the part of the patient" was elaborated. The main parts of the handbook include: Psychological characterization of a

person's personal profile with violent behaviour; Types and forms of aggression; Causes of aggressiveness; Procedures to assess the risk of aggressive behaviour; implementation of behavioural strategies; Communication strategy and patient training.

In order to identify the positive and negative sides of the developed handbook, it was provided to an expert group to give its opinion on the applicability of the handbook in Nursing Practice. According to the experts, there is sufficient information about violence and aggressiveness – sufficient and clear enough. From the handbook, nurses can get acquainted with the forms of aggression, as well as the factors that provoke the aggressive behaviour of the patient. The developed handbook specifies the professional responsibility of the nurse regarding behaviour and relationships with an aggressive patient. The handbook also defines the responsibility of the management personnel for setting up an organisation that identifies the specific actions of staff. The experts give a positive assessment of the included methodology for assessing the risk of aggression and the described communication strategy of the nurse with patients with aggressive behaviour.

## 6. Conclusion

Nurses have a great need for training and support in real practice in order to cope effectively with the situations of aggressive behaviour by the patient. In a hospital environment, patients exhibit first of all non-verbal or indirect aggression towards nurses, and cases of verbal and physical aggression are significantly less. According to nurses, a major cause of aggressive behaviour of patients is their medical condition, as well as their dissatisfaction with their expectations. Nurses are not well trained to recognise the signs of aggression, making it difficult for them to effectively deal with these situations in practice. In hospitals, it is necessary to focus on developing and introducing procedures to assess the risk of aggression, which will help nurses to make correct and on-time decisions. By conducting training of nurses and introducing the "Manual of Professional conduct of the nurse in a situation of aggression on the part of the patient" in university hospitals, it is possible to improve the relationship between nurses and patients and to improve the quality of nursing care.

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# Psychological Mechanisms of Development of Addictive Behaviour

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## Abstract

*Nowadays, drug addiction is one of the most common forms of social epidemic in the world, especially in adults' case. Understanding the biophysical aspects of drug addiction, as well as examining drug addiction rehabilitation in the late twentieth century, have shown that along with the medication for the treatment of psychosis, it is also necessary to have a psychotherapy. All the specialists working on this problem agree that any kind of addiction is an attempt by the individual to solve psycho-biological or animal-related problems, that is, negative affect relatively a way of overcoming, emotional self-regulation. Consequently, efforts should be made to correct the motivational-behavioural field of addicts and to address socio-psychological problems, well it makes then effect on their educational development also. Psychologically addictive behaviours as illusory-compensatory behaviours have led to a significant change in the hierarchy of behaviours, substantially personal deformities, social contacts and relationships. The purpose of psychotherapy is to reduce it, as this condition is considered to be the most important factor in drug use. If the rehabilitation program does not provide a clear answer to the question of what the drug will cost in return, the program is less effective. Therefore, the aim of the study was to empirically study the life-cycle orientation, psycho-protective mechanisms and personal profile of drug addicts. To study life orientation, the Crambo & Macholik test was used to examine psychological protection mechanisms – the Kellerman-Plutchik test, and to establish a personal profile – the C-form of the 16-factor Kettle test. A total of 135 people was interviewed, including 35 drug addicts. It is established that the addict is characterized by the deformation of the motivational-thinking sphere, which implies an interest, a purpose in life, a vital development. Oppression and the horrors of life, back to oneself and to life. The mechanisms of psycho-psychological protection that develop in ontogenesis as a means of adaptation and resolution of internal conflicts, in the case of addiction Mutual State-Disease-Adaptation. The deformation of the psychological protection structure provides powerful ways of blocking reality: the ability to critically reduce one's own illness dramatically decreases. The psycho-psychological protection system does not allow the drug-addict to adequately understand the severity of drug use, which, in turn, it helps to deepen pathological forms of deformity and behaviour. Personal profile of drug addicts is developed. Being addicted to alcohol is an emotionally unstable, more primitive, more timeless, more rigid, less practical, more primitive Worldview, harassment of intellectual interests, lower self-control, weak nebulous regulation, low self-discipline, impulsivity, Affect-it. Predictors of the effectiveness of psychoactive therapy within the framework of the addictive rehabilitation program have been addressed.*

*Keywords: Addictive Behaviour, Psychological Protection Mechanisms, Motivational-Value Sphere, Life Scale*

## Introduction

The role of psychological factors in the development and dynamics of drug addiction is widely acknowledged: an addict is a person who cannot tolerate pain and emotional stress (behaviourism), has an inner feeling of hopelessness. (Cognitive approach), it is characterized by weakness of the "I" in the face of pain and frustration (psychoanalysis), serious internal conflicts (transactional analysis). Addiction is a reaction to existential frustration, a protest against social pressure, boredom, the inability to self-realize (Humanism-Tur psychology). Despite the different approach to the problem of addiction, there is a common point: the emergence of addiction is seen as a reaction to an unbearable internal situation, the main feature of which is an intense negative affect.

Therefore, addiction is an attempt to solve psychological or life-biological problems, that is, a self-destructive way of overcoming negative effects, emotional self-regulation.

Psychologically, adaptation, as an illusory-compensatory behaviour, causes significant changes in the hierarchy of openness, substantial personal deformation, social contacts and relationships, and so on. Therefore, rehabilitation of drug addicts has three goals: social recovery, mental stabilization and social inclusion. After the removal of the physical dependencies, "dry addiction" remains [1]; The status quo of addicts can be described as a potential crisis, a vacuum that is considered to be the most important factor in the consumption expenditure.

It is impossible to identify the substantive "targets" of psychotherapeutic work without taking into account the motivational-value sphere of the addict and personal characteristics. In this regard, it is especially important to study such in-depth, unconscious mental activity as the style of defensive response, or the totality of the mechanisms of psychological defense, which is formed in the process of ontogenesis by typological features and specific social culture. Based on the experience of the development of the world and can be constructive or destructive. We think that in the process of narcotization, the mechanisms of destructive psychological protection are being formed, which hinders the process of rehabilitation, as it facilitates the easing of overcoming the negative effects, but a way to reduce the risk of critical assessment of both the self-esteem and self-esteem, as well as the devastating consequences of drug use. We think that in the process of rehabilitation, the field of motivational values, as well as the diagnosis of defense mechanisms may be predictably important – the course of treatment and psychotherapy to evaluate effectiveness. The aim of the present study was to test these assumptions.

## Method

### Participants

A total of 35 drug addicts were surveyed, with an average age of 41.7 years. Control group – a random sample of 100 non-addicted people was selected; the average age was 40.6 years. The study was conducted in Tbilisi.

### Instrumentation

Purpose in Life Test (PIL), Based on Frankl's [2] theory of purpose in life, Crumbaugh and Maholick [3] developed the Purpose in Life Test to measure a person's sense of meaning.

The test was aimed at empirically verifying the provisions of the existing logotherapy and regulatory neurosurgery logos. According to Victor Frank, the search for the meaning of human life (existential frustration) and thus the sense of loss of meaning in life (existential void) to neurogenic neurosis It burns. Based on the test, the authors

define the psychological construct as the meaning of the ontological meaning of life – life. In the Georgian version of the test, 5 subscales were separated by factor analysis.

The first three are related to the three constituent parts of life:
1) the goals of life (the future);
2) life process (present);
3) The result of life (past). The remaining two scales reflect internal locus control:
4) Representation of life control;
5) Ability to control your own life.

These factors (other than the other) can be considered as components of the meaning of a person's life. A similar result is obtained in the Russian version [4]; The Chinese version of the test also contains five subscales.

The Life Style Index – LSI, Plutchik, Kellerman, & Conte [6; 7]. This test was used to identify Ego-defense mechanisms. The following defense mechanisms are included: Compensation, denial, displacement, intellectualization (including undoing, sublimation and rationalization), projection, reaction formation, regression (including acting out and fantasy) and repression (including introjections and isolation). A total score, summing up all positive responses is also included, indicating an overall defensive functioning.

It was used to study personal characteristics Cattell's 16 Personality Factor Questionnaire (16PF), C form.

### Statistics

All statistics were carried out by using SPSS version 23 for Windows. PIL and LSI tests, also total scores tested for normality was used One-Sample Kolmogorov-Smirnov Test. All scores to follow a normal distribution. It was used to test the differences between experimental and control set Nonparametric Test – Independent-Samples Mann-Whitney U. Factor Analysis: Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization. Cluster Analysis was used Two Step Cluster. For builds a predictive model for group membership used Discriminant analysis.

Statistically significant intragroup difference Ego-Defense Mechanisms tested by Nonparametric Friedman Test for Related Samples Non-parametric Friedman Test for Related Samples was used to test the statistical significance of intragroup differences by protection mechanisms and for comparison with experimental and control set – Kruskal-Wallis Test.

### Results

### Purpose-in-life

Comparison of experimental and control set confirmed that the difference was statistically significant for both the overall score and all five scales. In the experimental group, all scalar indicators are lower than both the control set and the population norm (Test Rate).

The aim of the next analysis was to find out whether it is possible to differentiate additives from non-defects based on PIL test indicators. Discriminatory analysis confirmed the predictive significance of the test: Discriminatory function sharply separated experimental and control set ($\chi2=26.970$; $p=0.000$). Classification Results showed that 68.9% of the original grouped cases were correctly classified. There are three main predictors: Total meaning score, life goals (future) and internal locus control (Representation).

*Defense Mechanisms*

A statistically significant difference between the experimental and control set is confirmed by the expulsion (U=1170.500; p=0.003), compensation (U=1254.500; p=0.012) and reactive formation (U=1104.000; p=0.003) In my opinion: in the group of experimental, the rate of expulsion and reaction formation is higher, and the rate of compensation is lower.

Related Samples Friedman's Two-Way Analysis of Variance by Ranks confirmed the intrinsic difference between the frequency of use of protective mechanisms in both control (χ2=90.706; p=0.003) and in the experimental group (χ2=14.949; p=0.049). The first group in the control group is the Intellectualization (64), with the addicts – the reactionary formation (62), which is in the fifth place in the control group. Compensation, which ranks third in health care, ranks last with Adik-Tebe.

Factor analysis conducted to study the structure of the system of defense mechanisms revealed two factors in both groups (Cumulative Variance: control set – 62%, experimental – 56%). In the control set, the opposite forms are combined into different factors. In particular, the denial entered into the second factor, while its opposite projection – into the first; Expulsion – in the second, and replacement – in the first; Regression in the first, and intellectualization in the second, reactive formation in the second, and compensation in the first. In the group of addicts, the structure is deformed: in the first factor, the opposite substitution and expulsion are combined, and in the second, the opposite intellectualization and regression are mutually exclusive.

The purpose of the next analysis was to find out how it is possible to distinguish between control and experimental groups based on defense mechanisms. For this, a two-stage cluster analysis was performed; Eight protection forms and the categorical Variable Group were used as predictors. As a result of the classification, two clusters were identified: The "group" was considered to be the most important predictor of the separation of experiments. According to the importance of separating these two groups, eviction is in the second place, compensation is in the third place, and regression is in the last place.

Finally, Discriminant analysis is used to builds a predictive model for group membership based on LSI scores. The dissociative function separated the addicts and control groups (χ2=24.806; p=0.002). Classification Results showed that 68.1% of original grouped cases were correctly classified. There are four main predictors: compensation (-0.243), reactive formation (0.241), intersexualization (-0.230), and expulsion (0.211). "Regression" (0.061) has the lowest contribution.

**Personal characteristics**

Cattell's 16 Personality Factor Questionnaire found a statistically significant difference between control and experimental groups by eight factors: C (5.44 and 2.54; p=0.000), F (6.01 and 4.35; p=0.020), I (5.29 and 4.06; p=0.002), M (5.38 and 4.03; p=0.019), Q1 (5.23 and 3.94; p=0.019), Q3 (5.63 and 3.27; p=0.000).

**Discussion**

All indicators of the PIL test in the addicts' group are valid for both the control group and the population norm, which means that the addict has no future goals – he only lives in the present day; I am unhappy with my past life. He considers himself a weak person, who is not able to control his own life. The addict is a fatalist: he is convinced that conscious control of life is impossible, the choice is only an illusion, so planning for the future is meaningless. Such a picture indicates the deformation of the addictive motivational-behavioural sphere, which implies the vitality of the interests of the life, the

goals of life. Dissatisfaction with oneself and life.

The results of the discriminatory analysis give us the right to say that the Purpose in Life Test (PIL) reveals "targets" for psycho-corrective or psychotherapeutic work with addicts. Representation of one's self is the leading factor, the personal resource, through which the process of self-regulation is mediated [8; 9] and, consequently, the motivation to refrain from drug use. Long-term treatment after treatment is indicated for patients who have been subjected to life-saving goals and well-being following psychotherapy.

Critical Assessment of Rey Chapter or Kme-Deb [10; 11; 12]. Objectives and the idea of life can be considered as a resource that will contribute to the stability of the regime.

A person who is ready to be recognized and recognized as the cause of his or her particular problem is likely to have a more poetic approach to treatment.

The leading defense mechanism in the control group is intellectualization – a form of mature, defensive protection based on the fear of losing control. At the first level with the addicts is the reactive formation, which is the leading defense mechanism in the case of mania disposition, which is a joyous emotion; For this type of person, it is important to keep in mind the need to receive memorable stimulus – Hedonism. It is a less sophisticated, protectionist mechanism that prevents the penetration of anxiety-causing into consciousness and alters them. (Unconscious inversion).

The addict uses the mechanism of expulsion protection much more often than the non-narcotics addict. Eviction is a less mature, protectionist protectionism; The emotion of fear is fear. It is designed to relieve anxiety and prevent the emotions or trials associated with it. To prevent entry. A non-drug addict uses the mechanism of protection of the Commonwealth more often than the addict. Compensation should be avoided to avoid depressive feelings – this is a sufficiently high level of self-preservation and a suppressed state of mind. Bis means of overcoming. Addicts "universal compensator" – narcotics perform this function with addicts: Adict under the influence of narcotics is inaccessible to unpleasant feelings.

Reactive perception and expulsion, in fact, serve one purpose – to distort reality, or to prevent the penetration of negative information into consciousness (one's own senses, expected masterpieces, etc.). The addict is not ready to perceive and introduce objective information about himself and his illness. The results confirm that the mechanisms of psycho-logical protection have been transformed by adapting to the new attitudes of the person in order to form an addiction.

In the case of addiction, the structure of the system of psychoanalytic defense mechanisms is deformed: Factor analysis has shown that the forms of border protection with non-dependent probes are different factors. It unites, while in the group of addicts the opposite factor is combined in the first factor, and in the second – the opposite intellectualization and regression.

Discriminatory analysis confirmed the predictive value of The Life Style Index (LSI).

The developed forecast model identified four main pre-dictatorships: compensation, reactionary creation, intellectualization, and expulsion.

Very low rates of emotional stability and self-control are particularly prominent in the Adyghe profile – 2.54 and 3.27 standard tens. In comparison with Jelmr-Tel, the addict is emotionally more volatile, more forward-looking, carefree, emotionally less sensitive, less practical. It reflects a more primitive worldview, low frustration tolerance, and low self-control.

## Conclusion

Research has shown that addiction is a form of personality development. The addict person is characterized by a de-formation of the motivational-behavioural sphere, which

implies a major duality of life – in Sacrificing the goals of life, the vitality of life, and the meaning of life in general, self-sacrifice and life-sacrifice. The addict person is characterized by a system of destructive psychologically protective mechanisms: as a result of the formation of the addict, the mechanisms of psychological protection are transformed into new forms of personality.

Ego-defense mechanisms, which develop in ontogeny as a means of adapting and resolving internal conflicts, cause a state of emergency in the event of an addiction-De-adaptation. The distortion of the psychological protection structure provides powerful ways to block reality: the ability to critically assess one's own illness is drastically reduced. The Psychological Protection System The drug addict does not allow him to properly understand the severity of drug use, which in turn contributes to personality deformity. Deepening of pathological forms of cold and behaviour.

PIL and LSI tests can be used as part of drug rehabilitation program to assess the effectiveness of psychotherapy. Presumably, the PIL test can also be used for prevention purposes – to identify individuals at high risk of developing addiction. This assumption is based on the popular belief that the personal pronouns of the addict belong to a number of pro-radical phenomena.

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# Required Competencies of Managers for Effective Healthcare Management

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## Abstract

*The dynamic external environment and the growing demands of stakeholders require a continuous improvement in the functioning of health organizations. Competition between them and the increasing cost of acquiring knowledge determines the main aspects of the strategy for the development of medical institutions. [1] The quality of healthcare is increasingly dependent on human potential, especially with regard to managers. [3] Their knowledge and skills in planning, organizing, directing and controlling resources are a key factor in the effectiveness of medical care. [6] This determines the need for an analysis and diagnostics of the competencies of management personnel, as a foundation for quality and effectiveness of medical care and every area of activity in modern society. The purpose of this work is to examine the competencies of the managers needed for effective management of healthcare as a condition of their quality. The study is based on an analysis of existing studies and scientific research sources related to the nature and development of competencies of health care managers. The results show a need for a health care managers' competency monitoring system. It will provide an opportunity for early warning in the presence of problems in the functioning of health structures and will help to increase the quality of medical care, which is an important prerequisite for the economic stability of the medical institution.*

*Keywords: Education of managers, Competencies, Effectiveness, Health care management*

## 1. Introduction

The dynamic external environment and the growing demands of the stakeholders require a continuous increase in the efficiency of the functioning of health organizations.

The competition between them and the increasing costs of acquiring the knowledge needed to meet the standards of best management practices determine the main aspects of the healthcare development strategy.

The management of health care in the various structures of health care is carried out by managers who, in addition to being health care specialists, have the knowledge and skills to perform managerial and administrative functions [2]. These leaders need to have qualities, such as behaviours and attitudes that are specific to health care management, and must also adhere to the concepts inherent in nursing [3].

The functioning of medical institutions in a market economy requires new competencies of managers needed to provide quality health services in accordance with societal needs, which is a prerequisite for economic stability and sustainable development of organizations [1, 6].

The quality of health care, which is an important part of the overall system of modern health care, increasingly depends on human potential, especially with regard to managers. Their knowledge and skills in planning, organizing, directing and controlling

financial, human and material resources significantly determine the effectiveness of medical care [1, 2, 4]. Diagnosing the competencies of health care managers is a complex process that requires the use of various methods and complex approaches to identify all problematic situations in the hospital.

The growing importance of management and development of human resources for the functioning of each organization determines the need for analysis and diagnosis of the competencies of management staff, as a foundation for quality and efficiency of medical care and any area of activity in modern society. All this determines the relevance of the research work on this topic in the context of the constant public attention to health problems as part of the main contemporary challenges.

The purpose of this paper is to consider the competencies of managers necessary for the effective management of health care, as a condition for their quality.

## 2. Aim of the Study

The aim of the study is the management of health care in medical institutions and the necessary competencies of management, as a factor for quality and efficiency of medical care. The purpose of this work is to examine the competencies of the managers needed for effective management of healthcare as a condition of their quality.

## 3. Material and Methods

The study is based on an analysis of existing research and literature sources related to the nature and development of the competencies of health care managers.

## 4. Results

Healthcare professionals performing managerial functions are guided in their work by scientific fields such as management, organization, economics and politics [6].

Managers at all levels in the health system must have a set of qualities and skills to lead successfully. Every head of a structure must have managerial, economic and organizational knowledge. This knowledge provides the opportunity to direct the energy of managed resources in the direction of achieving effective results and improving quality. Most important is the ability to manage the human factor, which is the driving force of any organization. Finding the right ways and approaches to deal with workforce problems enables each manager to achieve the goals of the organization [1].

Health management is the art of mastering the process by which health resources are transformed into health outcomes. Increasing efficiency is achieved by health managers through the optimal combination of medical benefits and resources. To achieve this, they should combine the logic of the physician, which is the logic of the result, with the logic of the economist, which is the logic of the appropriate and rational use of resources [5].

In the studies of many authors, different frameworks of managerial competencies have been defined. The necessary managerial skills and competencies that are required of health care managers to perform their functions are analysed [7, 8, 9, 10, 11].

The results of the research provide extensive theoretical material and a basis for optimizing the training for acquiring skills, allowing competent performance of management functions.

Formulated competencies are usually related to certain skills or combinations of skills depending on various factors, such as the level of management, the level of development of the health system, staff qualifications, organization of work in the health structure and

others [9, 12, 13]. It can be assumed that the higher the managerial position, the more likely it is that the work will be more complex and require more skills [14].

In studies by Liang *et al.*, (2013, 2018) [12, 13], six management skills have been identified:

- making decisions based on evidence;
- administration and management of resources;
- knowledge of the health environment and the organization;
- communication skills and management of interpersonal relationships;
- leadership;
- initiative and innovation.

These skills, individually or in combination, depending on the above factors, are needed to apply the leadership competencies defined in the following frameworks:

- ✓ conflict resolution;
- ✓ motivating employees;
- ✓ solving problems;
- ✓ information analysis;
- ✓ control;
- ✓ organizing;
- ✓ coordinating.

The efficiency of the management and the quality of the health care are closely related to the motivation of the staff. To a large extent, it is determined by the socio-economic conditions for the development of society in a market economy, which does not reduce the role of health care managers. The creation of a favourable working environment and the motivation of the staff depend on their qualification and professional skills [15].

In accordance with the solution of the problems related to the motivation and development of human potential, in the modern world the emphasis is on concepts such as "lifelong learning", "interdisciplinary" and "multidisciplinary" approach in training and organization in order to achieve effective and sustainable development of each system [1].

At the same time, managers must be motivated for continuous professional development and development of their competencies. In this regard, the leading role is played by the strategy for the functioning of the health structure, which must be based on the development of human potential. Every medical institution must invest funds and energy for training, long-term qualification and professional development of its employees. This creates conditions and prospects for career development and provides the necessary attachment and motivation by linking personal goals with those of the health structure [1].

The motivation of health care managers to improve their qualifications and develop their competencies requires them to be informed about the assessment of the hospital management regarding the compliance of their knowledge and skills with the requirements for the positions held. They must also have a clear idea of what they need to achieve as a result of the training, such as the level of knowledge and skills, abilities and behaviour, and what change in pay new knowledge and skills lead to, which increases the professional and labor contribution of the employee in the medical institution. This process is related to the need to develop and implement a system for monitoring the competencies of health care managers, as a means to increase the efficiency of management and quality of health services [9, 14].

## 5. Discussion

Improving the quality of health care and sustainable development of human resources requires continuous development of the competencies of managers. This can be achieved by optimizing the organization of healthcare facilities in order to provide greater opportunities in the context of European principles of "continuity of lifelong learning", as well as by increasing the motivation of managers and health professionals to develop their professional competencies, having a clear perspective for career development [1].

Health care management is a complex and multifaceted activity, the essence of which lies mainly in the mobilization of human resources. This category includes all human potential, considered at a certain level in a relatively separate system [3]. Their management is one of the most important activities for a modern health organization, because the availability of human resources is a basic prerequisite through which health organizations can develop. This determines the main aspects of the necessary competencies for effective health care management, which consists in the optimal use of resources and their direction to the care of man and his health. The effectiveness of this process and the modern standards for quality of medical care determine the need to develop and implement in practice scientifically based models for health care management [1], and at the same time determine the need to develop competencies for practical application of these models.

The competencies for application of a methodical model for health care management are focused on the following main functions:

- staff and resource planning;
- training of staff and patients;
- organization of activities;
- hygiene;
- communication;
- quality control and evaluation.

These functions, health care managers must perform in a single and continuous cycle, which requires the ability to quickly move from one management function to another. In order for this process to be carried out effectively, it is necessary for managers to have specific methods and tools aimed at the respective activity and care.

For example, when planning staff, it is necessary to apply an appropriate methodology for assessing staff needs. This methodology includes a description of the specific activities performed by the relevant health care professionals-nurses, midwives, laboratory technicians or rehabilitators [1].

Proper organization of the activities of health care professionals requires the development of management tools that provide instructions for carrying out activities and care according to existing standards and good practices. Based on this, control of the activities and quality in the respective hospital structure can be performed [3].

Modern management must be carried out primarily on the basis of specific methods and approaches to ensure increased efficiency and quality of health care. Healthcare professionals who hold senior positions in hospital structures such as head and senior nurses (midwives, laboratory technicians, rehabilitators) need to have skills in working with databases and software products that provide continuous access to the information needed to make timely and adequate management decisions [1, 3].

## 6. Conclusion

The analysis of the survey data is the basis for developing a system for monitoring the competencies of health care managers and their propensity for professional development and professional development. This will provide an opportunity for early warning in the presence or occurrence of problems in the functioning of health structures and will help optimize the organization of work, as a prerequisite for quality and efficiency of medical care and a condition for economic stability of the hospital.

Based on the analysed data, programs could be developed to increase the competence of health care managers and to identify the main aspects of the human resources development strategy. In addition, the results obtained allow the development of effective and efficient programs that meet the expected needs for continuing education and development in health management. They also provide an opportunity to identify key management competencies that are specific to the work of the healthcare system.

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# Games and Media in Education

# (Co)Creation & Interaction at the Crossroad of Art, Technology & Special Education.
# Experimental Workshop with the @Postasis Real-Time Multiuser Collaboration Platform

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## Abstract

*The covid-19 pandemic highlights the need to exploit and upgrade distance education structures. During the last 28 months, our workgroup has been studying and developing an advanced platform towards distance education in Digital Arts, enabling real-time collaborative creation and interaction. The @postasis platform, developed under Erasmus+ @postasis: Virtual Artistic Laboratory project (apostasis.eu), enables setup of educational multi-participatory sessions, linking virtual entities, Internet-of-Things constructions (IoTs), and humans (e.g. avatars, observers, performers), in the globally interconnected physical and virtual space. It incorporates technological functionalities and specialized methodologies, in a composite and creative way, enabling a wide range of educational actions (courses, workshops, seminars) and large-scale exhibitions. These methodologies, even though they mostly target art education and have been applied to different levels of it (secondary, higher), they have the potentials to be applied, also, to special education. One such case is the experimental workshop "(Co)creation and interaction for special education", based on the "Creation of the world" methodology of @postasis. It took place between students of the Department of Special Education of the University of Thessaly (Greece) under the supervision of the Instructor Dr. Anastasia-Zoi Souliotou, and @postasis workgroup members from the Athens School of Fine Arts (@postasis coordinator) namely Professor Manthos Santorineos and Instructor Dr. Stavroula Zoi. The students experimented, based on @postasis platform, on how they could exploit emerging creative technologies and distance education concepts, towards including people with disabilities in new forms of educational activities. Individual phases of the workshop are analysed: collages creation based on physical materials with discrete haptic properties, transfer of materials and their properties in @postasis virtual space as textures, mapping of space, and creation of virtual entities (avatars, NPCs) 'dressed' with physical drawings, and potentials of adding IoTs for enhancing interaction. Each of the above creative phases also included a real-time multiuser session for jointly experiencing the potentials of a multi-sensory experience inside such a space. This experiment highlighted the need to make special education students aware of concepts in the intersection of creative technologies and distance education, for further investigation. As this constitutes an emerging research topic, thoughts for the future are presented.*

*Keywords: visual arts, digital art, distance education, special education*

## 1. The Need for Human Centric, Customizable Real-Time Collaboration Platforms

The covid-19 pandemic highlights the need to exploit and upgrade distance education structures.

Existing distance learning platforms emphasize mostly on asynchronous procedures that transfer the real classroom to the virtual space (e.g., share screen that corresponds to a "virtual blackboard"). On the other hand, multi-user, real-time platforms mainly target gaming or industrial applications (e.g., design industry) where each participant has a limited and specialized role.

There is a need for platforms that use elements from the above fields, but enable to envisage new forms of education, enabling instructors of different levels and fields of education to parametrically define their own educational sessions, based on the targeted students-participants.

As more and more people get familiar with distance learning, is there a need to upgrade involved technologies and methodologies? @postasis investigates this question through the definition of a suitable platform.

## 2. @Postasis Educational Methodology

@postasis platform (apostasis.eu) enables the setup of educational multi-participatory sessions, linking virtual entities, Internet-of-Things constructions (IoTs), and humans (e.g. avatars, observers, performers), in the globally interconnected physical and virtual space. @postasis is a framework combining a technological platform with educational methodologies that could be customized for different levels and fields of education.
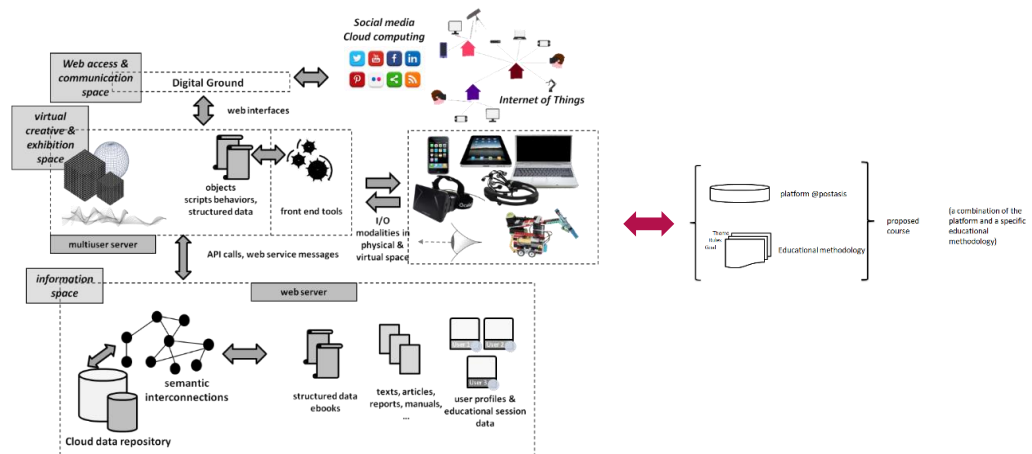


*Fig. 1. @postasis platform architecture*

## 3. Inside @postasis: Educational Project "Creation of the World"

@postasis incorporates technological functionalities and specialized methodologies, in a composite and creative way, enabling a wide range of educational actions (courses, workshops, seminars) in different fields of education. Those methodologies mostly target art education and have been applied to different levels of it (secondary, higher, collaborative art project) [1], [2], [8], [12].

However, they also have the potential to be applied to students of special education.

One such case is the experimental workshop "*(Co)creation and interaction for special education with @postasis platform*" described in this paper [1], [2]. It exploits "Creation of the world", a specialized methodology of @postasis targeting school teachers or people not familiar with technology, adjusted here for special education. More precisely, @postasis multisensory nature in combination with distance communication should benefit people with visual, hearing or motor impairments, deaf people and people with intellectual disabilities.

According to this methodology, students are encouraged to collaboratively create a multiuser virtual space inhabited by avatars and Non-Player-Characters (NPCs), based on the following axes: *I create an ecosystem. I create a society. I build in the empty space and create new spaces. I create heroes and give them life. I create heroes and give them behaviours.*

The heroes have the shape of a cube, so that no advanced modelling knowledge is required. They are recognized externally by the different shapes and colours/materials painted or put on their surface.
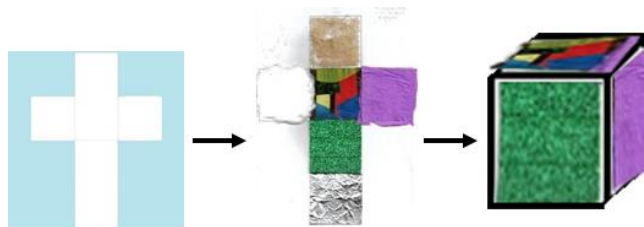


*Fig. 2. Texture mapping of @postasis cube NPCs*

Practically, this is analysed to the following steps, taking place inside the @postasis platform: a) Construction of space and heroes (avatars, NPCs, IoT mechanisms), b) definition of characteristics and behaviours (action, movement, goal), c) observation of the society of virtual entities and avatar intervention, d) communication with written messages (chat).

## 4. The Chance to Widen Experimentation in Special Cases of Education

Educational experience has highlighted the need to widen experimentations at the crossroad of art, technology and special education. Special education students should be made aware of concepts in the intersection of creative technologies and distance education, in order to be prepared for new forms of education, towards students with disabilities.

As the arts enhance self-expression and creativity in a liberal way, they help to overcome difficulties of students with or without disabilities in Science, Technology, Engineering and Mathematics (STEM) by enabling them to deeply understand complex notions, e.g., fractions and abstract concepts [4]. According to Zayyad students with specific learning disorders (SLD) should benefit from the inclusion of the arts in the learning process through the alignment of STEAM (Science, Technology, Engineering, Arts and Mathematics) education with the UDL (Universal Design for Learning) model [11].

From the reverse point of view, the bibliography also highlights the importance of broadening the use of multisensory technologies for art and other creative activities for all students. Multi-sensory learning enabled by technologies helps to adjust to the preferred learning styles of students with special needs and/or disabilities, as for

example in the case of technologies for the visually impaired and for people with learning disorders. [9]

Learning is expected to reposition or change relationships among human participants and the tools in a certain context [6]. It also provides us with new abilities for participation, belonging and experiencing our world [10]. Furthermore, the current shift to the age of empathy where organizations aim at dynamically reaching out and providing meaningful experiences of exchange and co-creation in the wider context of the society [5], underlines the need for an interactive, participatory and dialogic art [7]. This, in turn, calls for the inclusion of different publics and audiences embracing those with special needs.

@postasis platform focuses on these learning objectives by enabling students to be engaged in a learner-centered and active learning process where creation and interaction take place in a common arena of sharing experience and exchanging ideas.

During the lessons before @postasis seminars, students had created collages in order to explore visual and haptic qualities of different materials. The emphasis was placed upon different textures that facilitate recognition of different forms which is very important for all people, but also for people with special needs (especially with visual impairment). Several of these collages were then used to compose the ground of @postasis multiuser space (Fig. 3).



*Fig. 3. Students' collages compose the ground of @postasis digital platform*

In the first @postasis seminar students of special education were introduced to the concept, structure, and features of @postasis platform. Afterwards they created their own drawings, collages and mixed media techniques on A4 cube avatar templates. They came up with interesting aesthetic results using various materials and techniques. Their drawings were used as textures of the cube avatars and NPCs of @postasis (Fig. 2).

At the second seminar, students entered @postasis platform for the first time. They were impressed to see their own drawings, originally made on paper (handmade), to be transformed into cube-shaped entities (avatars and NPCs). Similarly, they were impressed by the ground transmitting their own handmade collages in digital space (Fig. 4).
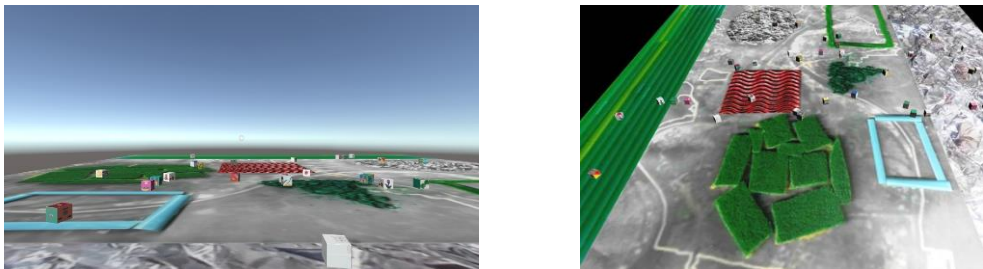


*Fig. 4. @postasis platform's screenshots in digital space*

Through avatar interaction and real-time chatting, they deepened to concepts involved in such a space (e.g., different perspectives, how senses from physical space are transformed into the virtual space).

At the third @postasis seminar students were introduced to the editing space of @postasis platform. They were shown how to define the main entities: space, avatars, NPCs, and how to assign their handmade materials to each of these entities. One of the most important aspects was to explain how the behaviours of NPCs are defined through code and how they could create emerging behaviours through variations in their parameters (Fig. 5). Predefined behaviours of @postasis platform, such as the stroller (flâneur), the follower, or the entity leaving traces were setup with different parameters.

During this seminar students of the University of Thessaly (Volos, Greece) interacted with students and researchers from the Athens School of Fine Arts (Athens, Greece).

The students had the chance to observe this evolving world from God's view and from avatar's view (Fig. 6), and interact with space (e.g. activating sounds assigned to certain materials) and NPCs.
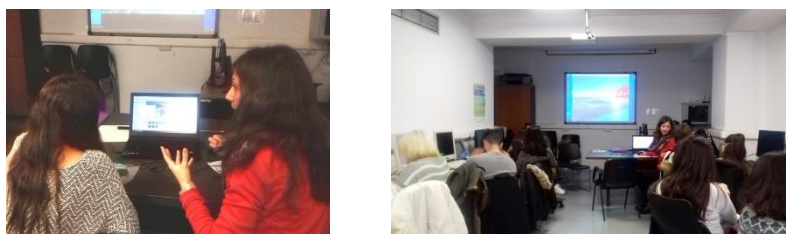


*Fig. 5. @postasis seminar in the creation of avatars and multisensory space*
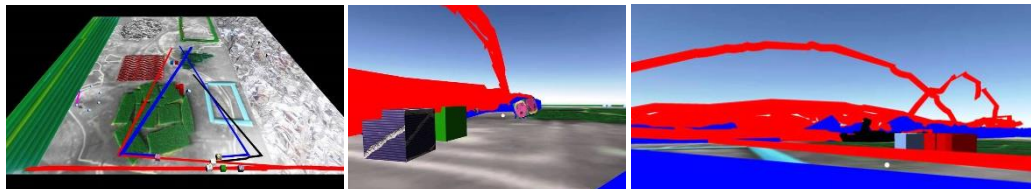


*Fig. 6. Screenshots from God's view and avatar's view (person's view)*

The synergy of different materials, media and art forms through the combination of traditional art with digital art dynamically disseminates the creative energy to different audiences rendering art a core element which actively connects with popular culture as well as with media culture and internet culture [3]. The unification of forces of different media and techniques in the (co)creation and interaction for special education workshop expands to the multisensory nature of @postasis platform involving not only vision, but also other senses: sound through sound triggers and touch, which was indirectly indicated in a mediated way through the sounds created by human intervention in a way that reveals the texture of the material.

As far as special education is concerned, a learning objective of utmost importance was to think about possibilities and ways of using @postasis platform with persons with special needs. Its multisensory nature should render @postasis platform accessible to different audiences embracing those with special needs. More analytically, the activation of sounds, the possibility of real-time communication with written text through non-verbal chatting, the indirect (or direct through the Internet of Things) implementation of touch, as well as the possibility of distance communication, (co)creation and interaction are expected to facilitate participation for people with special needs and/or disabilities.

## 5. Conclusions and Next Steps

The experience of (co) creating and interacting in @postasis platform rendered the students of Special Education Department of the University of Thessaly active creators of a new digital multisensory world. @postasis platform's inter-media and multisensory nature is expected to be exploited in special education through participation of people with special needs and/or disabilities. This constitutes a topic with possibilities for further investigation at the crossroad of art, technology and special education. Further developments of the platform, e.g., by using the Internet of Things (IoT), are also expected to highly enhance participation and inclusion.

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# A Virtual Reality Journey to the University of the Future: What Kind of Impact Could Artificial Intelligence and Learning Analytics Have on Universities?

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## Abstract

*The use of artificial intelligence (AI) and learning analytics (LA) in Higher Education (HE) has become a widely discussed topic with continued high relevance in Germany. AI-supported learning will become more important in the organization and teaching in HE [1]. Questions concerning the participation of students in this development as well as the elaboration of ethical guidelines received little attention in the discourse [2]. In this article, we address the problem of inadequate participation from students in the discussion of using AI in universities. As a solution we present a virtual reality (VR) environment, in which possible scenarios of future AI university developments are given. The VR-environment shows different exemplary scenarios in which AI could be used in HE and asks students and professors for an evaluation for each scenario. Students and professors deal with the topic of AI-based learning in HE through the insight of VR and can evaluate the AI scenarios. The results of the evaluation provide information about which forms of AI are ethically acceptable for students. Based on this information we will design an ethical guideline for using AI at universities.*

*Keywords: future scenario, artificial intelligence, learning analytics, higher education, ethical guideline, technology-supported learning, participation*

## 1 Introduction

AI is becoming a highly important field for the development of HE [2]. In Germany, especially the analysis and prognostic of LA, the support of individual learning opportunities and the development of machine learning tools are trendsetting [3]. The focus of LA programs is primarily to identify potential dropouts in advance and the related goal of significantly increasing the success of studies in HE [1]. While countries such as Australia or the USA have been carrying out LA projects at universities for years [1], Germany is just beginning to introduce LA and AI-supported learning in HE [4].

The main reasons for the current reluctance of using AI in Germany are both uncertainties in data protection and ethical concerns. These relate primarily to the indispensability of human judgement in the HE context and the risk of discrimination, irresponsibility, and lack of transparency through AI and LA [1, 2].

Another problem with using AI, according to a study by the *Institute of Internet and Democracy* in Düsseldorf, is that the opinions of students on technology-improved learning are not examined [2]. The survey of the study shows that students of the University of Düsseldorf are strongly dependent on the AI's user area. Accordingly, AI applications in university administration are considered less critical, while AI applications that are directly related to the students and their performance, are rated as critical. Most

of the survey participants reject dropout detection systems that use AI and LA to identify potential dropouts in advance [2]. This shows a large discrepancy between the HE policy desire to reduce the dropout rate through AI-supported learning and the student opinion on how AI should be used in HE.

This situation is the starting point of our article, in which we discuss how the opinions of students and lecturers can be considered in the debate on AI-supported learning in HE. The aim of our research project is to demonstrate students and professors' possible future scenarios of AI-supported learning in a VR-environment. After each scenario, students and professors are invited to write down their statements on the scenario in a text field within the VR-environment and to participate in a survey about the scenario.

The qualitative and quantitative elements of empirical social research make it possible to clarify what kind of AI-supported learning is desired by students and teachers in the HE context. On this basis, an ethical guideline will be developed, which will provide an orientation for the acceptance of students and professors regarding future AI projects in HE. Through our research project, both students and professors are inspired to think about technology-supported developments in HE and can influence the development of AI in HE.

Our research project is divided into four parts: 1. the elaboration of possible future scenarios and questionnaires, 2. the implementation of future scenarios and surveys in a VR-environment, 3. the testing and using of the VR-environment, 4. the evaluation of the data and the development of ethical guidelines for AI-supported learning in HE.
In this article we will focus on the first part of our project and give you a brief overview of possible AI-based future scenarios.

## 2. Method of Scenario-Technique

Based on a systematic review [5] and the analysis of various national and international AI tools and programs in the economic as well as in HE sectors, we lay the foundation for diverse future scenarios. Because this analysis is not yet completed, the full results cannot be presented at this point. Instead, we will give you two examples of AI-based future scenarios of the university. On the one hand, these are created on the KPMG study, which presents general future scenarios regarding AI possibilities [6]. The study was conducted in cooperation with KPMG, an international network of firms for auditing and management consultancy, and TRENDONE, a leading European micro-trend research institute, to identify trends and future AI developments in economy and society. In the study, four different AI future scenarios were developed on the indicator's grounds: trust or distrust, and regulation or autonomy. The scenarios address different perspectives such as the perspective of society, the state, or the economy. Our created scenarios based on this perspective and therefore focus on the following actors and aspects: Students, lecturers, HE policy, and overall situation. In the project elaboration following this paper, these perspectives will be further developed and differentiated, as appropriate [6].

In addition to the KMPG study, we have modelled the following example scenarios on already existing AI-supported projects in the university context.

Scenario 1: The University-Utopia of AI

The following scenario is characterized by the KMPG indicator's high trust in AI and high regulation of AI [6]. It is based on various AI projects such as the OPTES joint project [7], the AI Campus [8] and the Pepper-robot from the H.E.A.R.T. program at the University of Marburg [9].

Students: In this future scenario, students receive additional support through AI-based applications. Using LA, students are given individual tasks that adapted to their performance and knowledge. Because of the many individual and digital offers, students can study from anywhere and at any time of the day. Lecturers: Professors benefit greatly from the use of AI. With the support of robots and chatbots, questions from students regarding administrative processes can be answered quickly and do not cost the professors any time. Using various AI-tools, lecturers can send tasks, such as checking exams, to the AI applications. This gives them more time for their own research and for students who require intensive supervision. HE policy: The application of AI in universities and HE institutions solve political challenges, such as the dropout rate of the STEM disciplines, increasing student numbers or student diversity. Overall situation: The various universities' actors and HE institutes are satisfied with the AI applications. Many problems have been solved by the AI and studying and teaching corresponds again to the Humboldtian ideal.

Scenario 2: Welcome to Orwell's World

The second scenario describes a future characterized by the indicator's autonomy of AI and mistrust of the actors in AI [6]. As a basis for this scenario, we have oriented ourselves towards various LA programs that are characterized by supervising AI elements, such as the Course Signals program from Purdue University [10]. At the same time, we have been guided by the monitoring policy in Chinese schools [11]. To clarify: we do not insinuate a negative impact on the signal program in general and only use it as a source of interpretation.

Students: Students are under increasing pressure from the AI application in HE, they are under constant control and have lost many rights regarding their privacy due to poor data protection regulations. AI's evaluations regarding admission procedures, exams and homework are not transparent and cannot be fully understood by professors or developers. Certain groups of people have been classified as fundamentally unfit to study based on AI algorithms and have no possibility to start studying at all. Efficiency and a fast degree are the focus of the study. Lecturers: Lecturers are monitored by the AI and must justify themselves if their courses are not sufficiently attended or if students get poor grades. This situation leads to professors trying to give as much teaching content as possible to the AI applications and their withdrawal from teaching. The exchange between students and professors is becoming increasingly limited. HE policy: Although many challenges in HE policy have been solved by the AI; many other problems arose. Less young people decide to study at university because it seems too controlled and not adequate for their maturity as opposed to pupils at school. For the same reasons, there are also decreasing numbers of graduates who are interested in a career at university or college. Overall situation: The way of studying and teaching has changed greatly through the AI. The idea of efficiency in AI leads to discrimination and the loss of an educational ideal.

## 3 Conclusion

The briefly outlined scenarios are further specified in the research project and form the basis for next steps. The technical core of the project is the creation of VR videos, which will enable students and professors to experience the scenarios in a visual way.

This kind of dealing with the AI-topic strengthens the power of imagination within the viewers and allows them to get more deeply involved in the scenarios. In the upcoming

survey, the participants reflect and judge the different scenarios and form their own opinion about the different types of AI-supported learning.

To be successful in HE with AI-supported learning, it is essential that students and lecturers can accept and participate in this way of technology-sponsored learning and working. The elaboration of future scenarios outlined in the article is a way to reflect on AI in HE and to hear the opinions of students and professors on this topic. Only through this kind of debate and AI participation, it will be possible to implement technology-enhanced learning.

With our project we would like to improve the discussion and participation possibilities of students and lecturers about AI in HE by researching the opinions of students and lecturers on AI-supported learning and by creating ethical guideline.

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# CySecEscape – Escape Room Technique to Raise Cybersecurity Awareness in SMEs

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## Abstract

*With the evolution of information technology, more and more small and medium-sized enterprises (SMEs) are using technology to support and grow businesses. With the prevalence of the internet, SMEs are constantly evaluating and adapting new technologies such as software as a service, cloud computing, or the internet of things. All these new opportunities are coming with inherent risks of ever-changing cyberspace and overgrowing cybercrime. SMEs are soft targets for cybercriminals and the need for controls is evidenced by accumulating fraud incidents, identity thefts, denial of service attacks and illicit accesses or breaches of data over the last few years. This limits the ability of SMEs to innovate and gain business advantage. Previous research has shown that the human factor remains the weakest link in the cybersecurity chain, so it is paramount to make sure the employees receive effective training to embrace a security mindset. This study focuses on developing a prototype of a portable escape room to raise cybersecurity awareness in SMEs. Evaluation highlights that the escape room method is a worthy instrument.*

*Keywords: cyber security awareness, escape room technique, small and medium-sized enterprises*

## 1. Introduction

Digitalization has fundamentally influenced the way companies and their stakeholders interact with each other, making it possible to conduct virtual business over the internet without setting up physical premises as well as owning or storing goods.

These promising opportunities are associated with risks such as data breaches or cybercrime. Small and medium-sized enterprises (SMEs) that build the backbone of economies around the world are facing serious challenges related to cybersecurity as described in Table 1.

*Table 1. SME Cybersecurity Challenges Based on [1]*

| Resources | Although cybersecurity risks for larger companies as well as SMEs are similar, SMEs are confronted with tighter resource constraints that make it difficult to invest in cyber security measures. |
|---|---|
| Expertise | To strengthen their cybersecurity postures, SMEs need more in-house expertise. However, understanding of how to protect the company against cyber-attacks is reported to be lacking. |
| Responsibility | Responsibility for determining cybersecurity priorities is dispersed throughout SMEs. Therefore, the ability to have effective leadership in the cybersecurity function is missing in many SMEs. |
| Technology | Many SMEs use third party providers to support their processes. While this allows them to grow and scale within their budget, there is a risk of misjudging the remaining cybersecurity threats, which can quickly affect the entire organization. |

A considerable number of incidents in SMEs are due to negligent employees [1].

Therefore, awareness trainings are key for mitigating the risk. Several interactive training approaches have emerged in recent years. One very promising is the escape room technique. This study addresses the cybersecurity awareness challenges of SMEs using this approach.

## 2. Escape Room Technique

In escape room games, participants form a team to solve puzzles with the help of clues and strategies with the aim to escape from a confined area in a given time span.

Escape room challenges involve activities demanding close coordination and teamwork such as situational awareness, task division and specialization, communication, leadership, as well as critical and lateral thinking [2]. During these immersive experiences, the individuals take the avatar of in-game characters and feel very connected to the situation at hand. For designing an escape room, the framework of [3] and recommendations of [4] suggest to consider following elements:

**Participants:** Analysing and understanding the needs of the people who will experience the game is a crucial first step. Identifying the participant type helps in deciding the structure, difficulty level, duration as well as scale (group size).

**Objectives:** It is important to be clear about the concrete objectives and outcomes to be achieved through the game in order to shape the experience accordingly. In addition, game designers should include soft skills such as team building and coordination, problem solving and communication skills as a goal of personal development for the participants.

**Theme:** At the core of any escape room, a theme conveys the narrative, provides a context and justifies the challenges the participants must experience. Some popular themes are detective mysteries, prison breaks, escape the kidnapper or spy/espionage games. The theme forms the foundation for subsequent elements.

**Puzzles:** Puzzles such as word riddles, physical exercises, and tasks requiring teamwork, hand-eye coordination or the ability to think outside the box, constitute the backbone of the game. It is possible to combine the puzzles into a meta-puzzle, i.e., the individual solutions are linked together to find the final answer needed to escape the room. These so-called 'paths' can be a) **linear** (a puzzle leads sequentially to the clue for solving the following one), b) **open** (working on puzzles is possible in any order to arrive at the final solution), c) **multi-linear** (several linear paths towards a final solution can be played simultaneously, with intersections and different ends possible).

**Location & Equipment:** Very practically, all physical features have to be smoothly integrated into the game. The environment, in which the experience takes place, needs to be safe and pleasant.

**Evaluation:** Evaluating and constantly refining the escape room is an important task helping to reach the intended objectives.

Although a new phenomenon, there are several cybersecurity escape rooms for corporate purposes, including mobile versions that can be played in a truck, e.g., [5], [6].

The originality of this study and the prototype is its focus on the challenges faced by SMEs and the associated creation of a portable game. Being played directly in the SMEs' own office, it is flexible and ensures a high degree of identification with the reality of work.

## 3. CySecEscape – Portable Escape Room for SMEs

To meet the SME needs, the 'CySecEscape' prototype considers following aspects:

- **Targeted theme:** To enhance immersion, the theme relates closely to the professional life of SME employees. It revolves around investigating financial fraud and finding an absconding rogue employee.
- **Time & costs:** The pure playing time is limited to 40 minutes framed by a quick briefing and debriefing session. This way, the participants can predict the time investment very well. In addition, costs should be controlled to make the game an attractive proposition for SMEs.
- **Flexibility:** The designed game is portable (fitting in a cabin-size suitcase). All the puzzles rely on easy-to-obtain requisites such as keys, plants, and a laptop.
- **Small scaling:** A minimum of two and a maximum of four participants can effectively play the developed game.

Fig. 1 summarizes the features of 'CySecEscape':
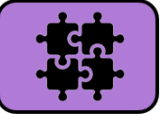


| PARTICIPANTS | OBJECTIVES | THEME | PUZZLES | EQUIPMENT | EVALUATION |
|---|---|---|---|---|---|
| • SME owners<br>• SME employees<br>• 40 min. plus briefing and debriefing<br>• 2 to 4 participants | • Raise cybersecurity awareness in SMEs<br>• Soft skills: team building, knowledge sharing, peer learning, problem solving. | • SME Financial fraud investigation<br>• Locating absconding rogue employee | Puzzles covering<br>• Physical security<br>• Data disposal<br>• Password Hygiene<br>• Phishing<br>• Social Media<br>• Social Engineering<br>• Online Banking | • SME office<br>• Mugs, plants with clues<br>• Preset office desk<br>• Preset laptop<br>• Preset email, bank account, website, social media account | • Feedback<br>• Reflection<br>• Evaluate learning objectives |

*Fig. 1. Prototype Applying the Approach of [3]*

**Participants:** The escape room addresses SME owners and employees. Their particular challenges in the area of cybersecurity were analysed as a prerequisite for understanding the target group.

**Objectives:** While the overall objective is to raise cybersecurity awareness, the participants should in particular become familiar with the key elements of physical and cybersecurity and their applicability in practice. Additionally, soft skills such as problem solving and peer learning are encouraged. A literature review and expert interviews resulted in relevant topics the game intends to improve (Table 2).

*Table 2. Topics and Puzzles*

| Topic | Puzzle |
|---|---|
| Physical Security | Players experience effects resulting from not having a clean desk, e.g., when a key for a cupboard is easily accessible or a smartphone is left on the desk. |
| Information Disposal | During the game, participants get the clue to the bank contract number from half shredded and not well-disposed bank statement. |
| Password Hygiene | As an example, players experience the effects when passwords are easy to guess (i.e., using name of child and year of birth whereas this information is placed openly on photos and mugs on the office desk). |
| Securing Sensitive Digital Data | The puzzles address unprotected Excel files containing critical business data and the use of the same password for multiple critical business applications, including mailbox and social media accounts. |
| Public Oversharing | By posting too much information publicly in social media, the location of the criminal employee can be discovered in the course of the game. |
| Phishing & Online Banking | A phishing email in the mailbox hinders access to online banking. |
| Social Engineering | The game simulates a telephone call placed by a person pretending to be a bank employee trying to obtain a password. |
| Remark: wide variety of topics concerning specific SME situations like Wi-Fi security, software updates, procedures around access/ways of working in critical business applications can be covered by adapting the puzzles. | |

**Theme:** The game deals with financial fraud in a SME committed by an in-house employee. The players seek to save the SME by stopping the online bank transfer carried out by the criminal. Participants must find clues left by the fugitive employee and link them together to stop the bank transactions. Figure 2 shows the game flow covering the phases with related activities and media.

| **Activity** | Context Setting | Initial Investigation (Team Building) | Connecting the clues | Stopping the crime |
|---|---|---|---|---|
| **Medium** | Letter / Video | Physical work + Puzzle | Online activity | Online activity |
| | Phase 1 (5') | Phase 2 (10') | Phase 3 (15') | Phase 4 (10') |
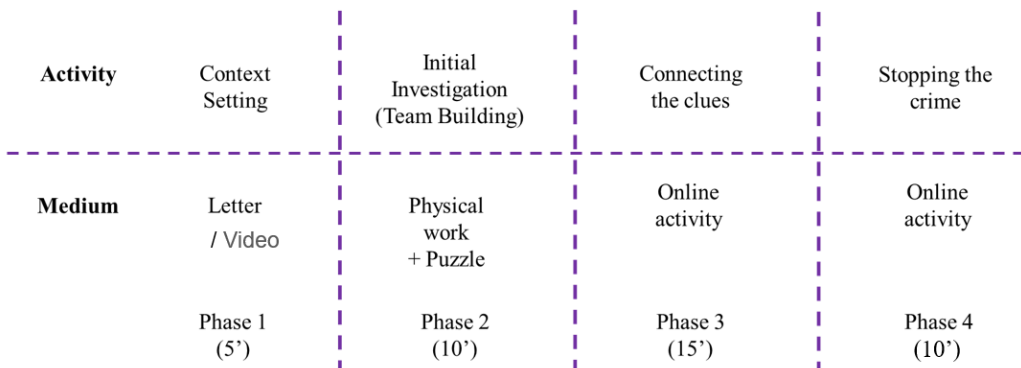
*Fig. 2. Game Flow*

**Puzzles:** The puzzles listed in Table 2 serve as core of the game, forming a multi-linear path.

**Equipment & Location:** Commonly available props such as the office desk, some plants, or a paper shredder are used to play the game at the SME location.

**Evaluation:** A developed questionnaire helps to get the participants' feedback on the usability and applicability of the game and to assess the learning objectives. Moreover,

the game master observes the performance and effectiveness of the participating groups in order to provide an overview of the current state of knowledge during the debriefing and to suggest further measures.

Four groups comprising twelve employees from different sectors and with varying levels of cybersecurity expertise formally tested the prototype. The usability was rated as 'very good' with a score of 4.46 out of 5 points. In terms of usability, the participants appreciated the captivating theme, the puzzles on key topics, the portability, the short duration, and the limited budget required for the game. Further feedback from the players showed that the developed prototype is a highly instructive, immersive, entertaining and engaging team building activity.

The game master's observations revealed several areas, in which the groups did not know the concepts and learned them from the fellow players. Especially the awareness of phishing is a topic where all groups failed to discover the trap.

## 4. Conclusions and Future Research

Overall, it can be concluded that the escape room method is a worthy instrument to increase cybersecurity awareness in SMEs. In future, it will be critical to evaluate the long-lasting effects of the training to ensure the objective being met.

The current version of the game is designed for small group sizes. The puzzles are very interactive and require the attention of the game master. This allows for a very intense experience. However, it turned out to be a limiting factor that it is difficult to run multiple instances of the game in different rooms in parallel.

With the SMEs being resource constrained, one more area to be explored is how 'CySecEscape' can be embedded in a wider context (e.g., training-as-a-service offering).

Altogether, there is good amount of potential in game-based learning methods like escape rooms, and their applicability in enterprise awareness trainings should be expanded further.

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# EcoCEO™: Understand the Circular Economy by Playing

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## Abstract

*While Europe is working on the transition toward a more sustainable business model, concepts such as linear and circular economy are rarely dealt with in secondary schools. Here we present an educational game, EcoCEO™, that aims to transfer knowledge about circular economy and sustainable entrepreneurship in a hands-on and fun way. During the game, players act as Chief Executive Officer (CEO) of a company that extracts raw materials and produces microchips. They are asked to make decisions on employees' allocation, resource management, production processes, investment strategies and revenue models. EcoCEO™ has been developed in the framework of the project "SmartPlaCE@Schools – Serious game Platform for education on Circular Economy in high schools" funded by the European Institute for Innovation and Technology (EIT RawMaterials). It is a useful tool for making youngsters aware of the complexity and interrelation of economy with environmental sustainability issues and with the benefits of closing material loops. By playing it, students from high schools get to know concepts such as critical raw materials, recycling, take-back systems, reuse and repair activities. Furthermore, they are induced to practice discussion and trading to reach shared decisions. The gaming approach introduces students to these matters in an interactive, enjoyable and self-explanatory way, motivating them to delve even deeper into the raw materials sector and the circular economy autonomously or by using the educational materials that SmartPlaCE makes available to them and to their teachers.*

*Keywords: gamification, circular economy, raw materials, secondary school*

## 1. Introduction

The current business models are largely inspired to the linear economy but this approach is proving to have unsustainable costs from social and environmental points of view. Linear economy follows the 'take-make-dispose' approach: it takes resources from the ground to make products which the consumers purchase and, when they no longer want them, they throw them away. This model is based on the assumption that natural resources are endless and easy to source while the waste is cheap to dispose of. The shortage of some raw materials and the occurrence of some pollution-related diseases showed that this model is no longer working for businesses, people, and the environment. Those are the reasons why the European Union is planning a radical shift from linear to circular economy.

The Ellen MacArthur Foundation defines circular economy as a way to maintain the

utility and value of products, components and materials as longer as possible. It minimizes the need for new inputs of materials and energy, while reducing environmental pressures linked to resource extraction, gas emissions and waste disposal. This goes beyond just waste, requiring that natural resources are managed efficiently and sustainably throughout their life cycles [1]. Underpinned by a transition to renewable energy sources, the circular model is expected to build economic, natural, and social capital, providing opportunities to create well-being, growth and jobs, while reducing environmental pressure [2]. The transition from the current linear economy to a more circular one needs drastic changes in the way we look at products and in awareness on raw material limits, motivating and spurring for a new entrepreneurial thinking.

To achieve circular economy, bio-based materials are preferred to mineral ones, products are designed for a longer use and reuse cycle, they are well maintained, repaired and refurbished, they have a reasonable second-hand value, they can be expanded or upgraded to keep up with technological evolution. End-of-life products must be considered as resources, they can easily be taken apart and turned into new products while broken or useless parts must efficiently be divided in the component materials for the recycling. In this way, product lives are extended and material cycles are closed, minimizing the need for new materials and energy. At the same time, environmental pressures linked to resource extraction, emissions and waste are reduced.

At the present, the key concepts of circular economy rarely are part of traditional education curricula, so the staff of the project 'SmartPlaCE @*Schools* – Serious game Platform for education on Circular Economy in high school' created the educational game ecoCEO™ in order to fill this gap supporting the teaching of circular economy by using gamification, to make learning more motivating and engaging. Gamification means that the learning goals are included in the subject and in the rules of a game; consequently, the players autonomously practice, match after match, their own education without the feeling to be included in a kind of training [3]. Furthermore, if the students play in teams, they develop proactive dialogue, the ability to reach shared decisions and the skills to trade with an opposite team. In general, this informal education can be used to stimulate problem solving capability and to make team building activity, not only for youngsters, but also for adults [4].

## 2. EcoCEO™, the Game

EcoCEO™ is a tabletop game addressed to students of high schools (suggested age group 15-18), it is composed of nine table boards, several types of cards and 'credits' (Fig. 1). The game can be stopped after 50 minutes, to adapt it to the standard school timing, or when a team either completes its boards, or at the end of the card deck. The printable English version of the game and the instruction manuals in several languages are downloadable and video tutorials are available online in English with subtitles in several languages [5].

*Fig. 1. EcoCEO<sup>TM</sup> overview picture of the game*

In the game, players act as Chief Executive Officers (CEOs) of a microchip factory.

The company can be managed by a single or a couple of players, consequently from three to eight people can play together. All the teams start in the same condition but, along the game, they are induced to grow their company starting to produce smartphones or e-bikes, two symbolic hi-tech electronic goods, typical of the current age, very popular today among youngsters but very energy and material demanding. The aim of the game is not to accumulate as much money as possible, but to collect 'victory points' that are markers of the company resilience and circularity. The players are asked to make decisions on employees' allocation, resource management, production processes, investment strategy and revenue models. By combining different investments, they can address their company toward different value chains and improve resilience or profitability.

At the beginning players work in a linear economy model but, when the card signalling 'scarcity of raw materials' appears on the deck, the game switches to the circular economy model. Thus, the teams expand their value chain thanks to a variety of strategies, such as 'waste recycling', 'take back waste and sell for scrap' or 'for reuse', and 'renting services'. The players using all these actions gain more victory points and, if this teams in the first phase of the game invested in 'efficiency' and 'substitution' benefit from the advantages to manage the full value chain and probably will win the match.

During the game several different events can randomly occur, for example: 'tax on $CO_2$ emission', 'employees strike', 'new materials reserves', 'EU support programmes', etc. These events benefit the players who organized their companies more resiliently and sustainably. When the mega-event 'Severe material scarcity on the market!' appears on the deck, the availability of primary resources is halved and the teams understand the importance of recycling and close loops. All these events show that investing revenue toward improving production processes, lengthening value chains, and close product loops make companies more resilient. Victory points measure this determining the winner.

The SmartPlaCE Consortium tested EcoCEO™ in their four countries (Belgium, Estonia, Germany, and Italy) with several classes of students and organized a game session at the IV European RM@Schools Conference in Bologna in 2019, involving teams from different parts of Europe.

Fig. 2 shows the results of a short satisfaction questionnaire submitted to 102 students, mainly Italian, after the first match. The collected data showed that the students enjoyed EcoCEO™ and a half of the students felt inclined to learn more on the subject after playing the game. If the game sessions are accompanied by other educational tools such as seminars or a final discussion with experts, the ask for further information was higher.
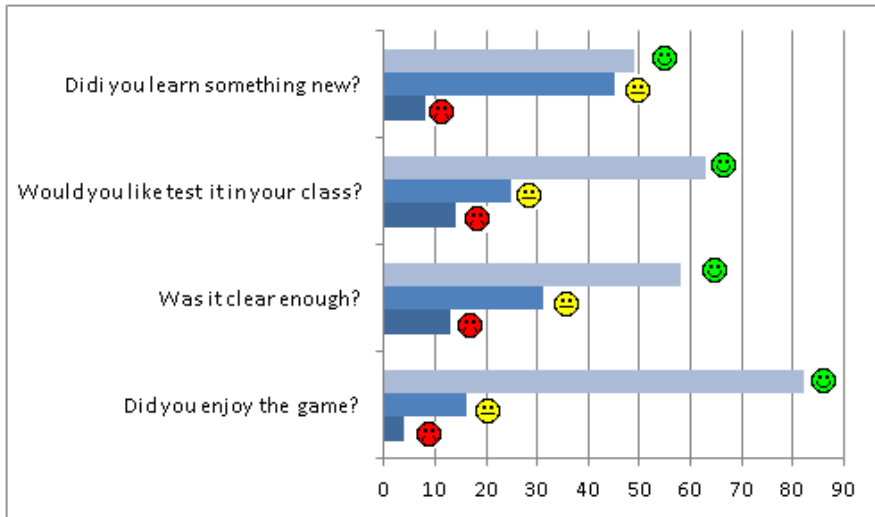


Fig. 2. Results on the satisfaction questionnaire by students

## 3. Educational Materials and Learning Goals

EcoCEO™ transmits basic knowledge on circular business models but it also should stimulate players to look for further information on this subject and related one. To satisfy this need, the SmartPlaCE Consortium is setting up a 'teacher board', to consult on the further tools and educational material that will be available for teachers. Thus, an online platform [5] is going to collect the material to help schools to integrate EcoCEO™ and circular economy topics into their educational curricula. This educational material provides complementing background information on the subjects addressed in the game, and suggestions for a wide range of linked learning activities, such as suggestions for homework, quizzes, roleplay games, hand-on activities, and experiments to perform in the school laboratory. They contain relevant information on topics such as material mining and processing, material challenges, product value chains, new circular strategies and business models, and sustainable materials consumption, providing both valuable background information for players and learning materials to be used individually.

Moreover, as typical school activities are divided into separate disciplines, there is a particular need for linkages between subjects and interdisciplinary courses to reflect today's constantly evolving and complex society. The game and learning materials will cover a multitude of fields like economics, geology, technology, environmental science, negotiation, accounting, and corporate governance. Because of this multi- and interdisciplinary focus, they will form a means to decrease the discrepancies between narrowly focused school subjects and the real world, with its natural interaction between the fields mentioned. Moreover, the game may foster discussion about sustainable entrepreneurship, consumption patterns, resource scarcity, work dignity and waste

management, and provides a clear link to the European Union Green Deal [6], its Circular Economy Action Plan [7] and United Nation Sustainable Development Goals [8].

According to it, a selection of more tangible and thematic learning materials has been developed in order to translate the theoretic concepts into concrete case studies and examples appealing to the students' field of interest and everyday life. In regards to one of the electronic goods of the game, the smartphone, some activities are suggested to present the huge number of critical raw materials present in it and to discuss social and geopolitical conflicts behind its supply. Taking into account that every year, in Europe, 120 million people change their smartphone, students are invited to discuss the importance of the substitution of critical materials with sustainable ones, the design-to-repair to lengthen the use life of the device, the take-back and recycling activities. As an experimental activity related to that, it will be possible to download the protocol to perform the leaching of electronic boards and the recovery of copper in the laboratory of the school.

## 4. Conclusions

The transition toward a circular economy is becoming a goal for the European Union but it is not yet fully expressed in official high school curricula. The test on EcoCEO™ demonstrated that it is a useful tool to make students aware of the complexity and interrelation of economy with social and sustainability issues. The game presents concepts such as raw materials and circular economy in a funny and engaging way, fostering the aware consumption, opening to them new occupational perspectives and stimulating environmental-friendly entrepreneurship. Finally, teachers may use the game to stimulate pupils to reflect on the two business models, to look for information on their own, and to engage them in the other activities available on the web platform.

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# How can Artificial Intelligence Improve the Academic Writing of Students?

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## Abstract

*The acquisition of academic writing skills is an essential part of higher education [1, 2]. Across the disciplines, it is evident that students have a high demand for inductive and support services for methods of scientific work [3]. Due to the increasing number and the growing diversity of undergraduates, students tend to receive less one to one support or individual supervision when writing their thesis [4, 5]. In turn, this worsens the situation and leads to a poor scientific education and reducing motivation of the students. In our paper, we would like to address this problem and present a technology-supported solution to improve students' academic writing. Our research idea is to develop new learning settings with the assistance of an AI-supported text generator, which helps students improve their writing skills without having to be dependent on a high level of mentoring by their professors. The implementation of the project will take place in Academic Writing Courses at multiple Graduate Centres within Germany.*

*Keywords: text generator, artificial intelligence, AI-supported learning, higher education, writing skills*

## 1. State of Research

In Germany, rising student numbers and the increasing diversity of students do not correspond to more chairs or additional teaching staff in the domain of scientific writing.

Hence, these two recent issues in the field of post-secondary education both have an immediate impact on the quality of supervision. However, it is a major goal of each study programme to enable students to write scientific papers. Therefore, this issue is relevant for higher education.

According to a nationwide representative study by the German Centre for Higher Education Research and Science Studies, university students face difficulties when writing papers. 25.7% of this sample report great difficulties. More than a quarter of all the respondents (30.4%) rate existing introductory courses on methods of scientific work as not particularly useful for their studies [6]. Besides, university teachers rate their students' overall academic writing skills as rather low [7]. Especially students who must overcome linguistic barriers due to a different native language face difficulty. Similarly, students of the STEM disciplines, who are barely ever confronted with the writing of academic texts during their studies, face severe problems with the complex task of academic writing [3].

In our project, we would like to use an AI-supported tool to improve the writing skills of students. Our overall goal is to make it easier for a broad variety of students to write academic texts. The use of AI in educational contexts is increasingly coming into focus

in many countries, including Germany [8]. In particular, the United States of America, Japan, China and Australia are taking on 'pioneering roles' in the use of AI in universities, colleges, and schools [9].

In 2020, the use of AI tools has already been put into effect in a host of post-secondary teaching settings [10]. Germany's very latest examples of application in this sector include the analysis and prognosis of learning analytics, the elaboration of individual learning offers, and the development of machine learning tools [11]. Where AI is combined with highly individualized learning paths and new forms of self-education, new possibilities of automated analysis and evaluation of learning processes and of teaching improvements open up. However, new fields of problems and research questions also arise: besides implementation issues, new ethical, social and cultural-technological questions arise, which partly go far beyond singular subject perspectives.

There are also some recent attempts to support students in writing scientific papers using AI-based technologies. One example is the Thesis Writer, developed at Zurich University of Applied Sciences in Switzerland [12]. Technologies like these are usually trained to review texts primarily for grammatical or syntactic mistakes and are not used to inspect semantic aspects of language use (such as coherence, argumentation structures, pertinence etc.). Neither do they focus on supportive issues, such as the development of writing strategies, for instance. Semantics and contextual writing support are of high relevance when it comes to writing a well-composed and well-informed academic text. Currently, AI tools do not provide that kind of assistance yet [13].

## 2. Realization

In a first step of the project we would like to conduct a pilot study on the use of AI-based text generators in connection with the improvement of writing skills of students using the text generator language model GPT-2 from the OpenAI developer team. This text generator is freely accessible and is considered market-leading in international comparison. The GPT-2 text generator is able to formulate meaningful text on various topics using an AI-supported text database.

With this AI tool, users can write the beginning of a sentence in a text field and the AI text generator will continue writing a paragraph one word at a time on the topic addressed. Their language model contains 1.5 billion parameters, trained on a dataset of 8 million web pages. The tool predicts the next word, given all of the previous words within some text. We would like to use this technology for educational scenarios in the university context to help students improve their writing skills.

The main research question of the pilot study is to what extent students acquire a writing competence with the help of the AI tool, which enables them to meet different writing occasions in their studies with a basic knowledge and ability, even with a low degree of supervision by professors. For this research purpose, we will conduct an educational technologists' research project on teaching by the use of AI within the graduate centre of up to eight leading German universities. We will build upon an innovative approach towards teaching scientific writing that has been implemented in these universities [14].

Our first step will be to implement the text generator in our local context and to integrate it into a new online-course on scientific writing. Students will work on a text proposal on a topic of their choice. They insert a few lines of text into the tool and it will continue their writing. As a next step, they will check for stylistic issues, verbose style or inconsistent argumentation and improve the text according to the standards of academic writing. While editing the text, the Artificial Intelligence assesses improvements instantly making the writing process a joint effort. Lecturers provide feedback on the final version

of the text which is also provided to the AI. By improving the AI-based writing assistance, students learn to take the professor's perspective and can better anticipate how a good academic text should be structured, and which mistakes should be avoided. In addition to improving the writing skills of students, a further aim of the project is to inspire students for technology-supported learning without losing a critical view on AI. Through the creative approach, students experience technology-supported learning as active participation, in which AI has a stimulating and participatory but not a controlling function.

To give students an insight into AI from as many perspectives as possible, the project will also discuss critical aspects of AI-supported learning.

The teaching setting is illustrated here with the help of a fictitious person:

Kira, 20, is studying communication sciences at a German university. She has to write her second essay this semester, after barely passing the first one. Her supervisor had to combine several students into one advisory group because their cohort exceeds the teaching capacity. He answered her questions mainly by referring to an introductory book he had written 15 years ago and which she finds quite difficult to understand. Due to her negative experiences, she is very much afraid of scientific work. Kira has hardly any experience in scientific work and she never felt easy with writing assignments. Back at school she was told at several occasions, she did not have the 'talent to write'. Especially, she finds it difficult to take up the writing process.

Kira's problems are: 1. little knowledge of scientific work, 2. bad previous experience, 3. fear of bad grades and fear of failing again, 4. Writer's block, 5. little motivation/interest in scientific writing. Kira uses the AI-supported text generator to obtain information on a topic of her choice. She checks the text section in a digital writing tool for stylistic errors, unclear formulations as well as illogical argumentation chains. By applying her corrections, she improves the text according to criteria of scientific work she had received in an online session before. After completing the first revision of her draft, Kira decides that scientific staff should evaluate her corrections and give her feedback and further advice on the manuscript. The AI-text generator accordingly solves the following mentoring and supervision problems: 1. overcoming the fear of writing, 2. solution of writer's block by the text generator, 3. developing an understanding of poor formulations and illogical argumentation chains, 4. developing an understanding of well-written scientific texts 5. development of motivation/interest in scientific work.

## 3. Following Steps

After the pilot study, we will cooperate with computer scientists who have expert knowledge of the GTP-2 language model. Our cooperation's goal is to apply the model to a German-language text generator which will help students in different learning environments to improve their writing skills.

The outcome of this long-term project is a research-based learning environment that combines pedagogy and technology to support the development of academic writing skills – in relation to the demands of different research disciplines. Fields of application offer a variety of scientific writing occasions and situations, ranging from a student's mail requesting a topic, to drafting a thesis, study, exercise, and poster texts, articles, or even research proposals.

In order to promote basic writing skills for science, the pedagogical-technical learning environment is aimed at (1) students who can use the learning environment for self-learning, (2) teachers who can integrate the learning environment into their own courses, and (3) writing centres which can use the learning environment to support academic teaching.

## 4. Conclusion

The focus of our project is to significantly improve the writing competence of students with the help of technological learning and to reduce the workload of professors in supporting scientific writing. At the same time, we believe that our project has found a way to integrate AI into an academic learning setting, in which AI does not have a monitoring or controlling function. Through this change of perspective, students experience a rarely considered type of technology-supported learning and experience participation and activation through the AI text generator.

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# Teaching Vocabulary through Games in the EFL Classroom: A Case Study

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## Abstract

*Teaching a foreign language to very young children has been an increasingly dominant trend in this rapidly globalizing world. The most common foreign language in Turkey is English which in public schools is taught from 2nd grade. However, English is taught as a main subject in private kindergartens and elementary schools of Turkey. Like any other children around the world Turkish students accept new foreign languages easily, but they get bored very fast if the teacher is teaching them using the old traditional methods and techniques. The study overviews the teaching of English vocabulary through games to young learners in this case to kindergarten students. This will be a report of an observation conducted at a Private kindergarten in Ankara. The participants for this study were one teacher and fifteen students. The result of this research will be useful for teachers of the kindergarten level in the EFL context to help them improve their performance in teaching and eliminate the stress factor from classrooms in learning foreign languages at a very young age.*

## 1. Introduction

Children start kindergarten at the age of 3-6 before they enter a primary school in Turkey, in Kazakhstan, and in many other countries. At these ages, they are naturally curious and enthusiastic to explore the world around them. They like to be active and have a lot of energy which make kindergarten best time to benefit from physical activities to teach a language. Most children are keen to gain new experiences including learning a new language. English is considered as a foreign language for the Turkish children, which is learnt from kindergarten level until University level. English is completely different from Turkish language being look at from the system of structure, pronunciation and vocabulary. The teacher should give the materials through an interesting technique in order to make the learners enjoy the teaching-learning process. At an early age foreign language should be taught in a playful way and full of physical movement with varied activities (do not give them the same activities day by day) so that they are not aware that they are learning language. By playing children have a chance to explore, find out, express their feelings. Thus, this study will begin with defining the concept of kindergarten, further continue with the literature review section in which studies on teaching vocabulary to young learners will be discussed, finally it will accentuate on examining the effectiveness of using some sample of games which are described in Table 1 below as the best techniques in learning and revising vocabulary. The study is aimed at answering the following questions: 1. Do vocabulary games attract the students' attention in learning? 2. How well vocabulary games encourage the kindergarten students' vocabulary mastery?

## 2. Kindergarten

Kindergarten is an educational institution for young children, usually between ages 4 and 6. Even though the goals of Kindergarten may vary nationally and by each individual school, typically it is aimed in helping the young children in social, emotional, and academic development. It also includes the use of language, the development of an initial understanding of mathematics. In addition to math and language arts, which are a major focus of kindergarten, children also learn science, art, music, health and safety, and physical education. Even though not every child is obliged to attend a kindergarten, it marks the start of a child's academic career, which will help children to develop their knowledge, creativity, through their activities in the school. The aforementioned definition of Kindergarten aligns with what Friedrich Froebel is the first educator who opened the first kindergarten in Germany in 1837 said about kindergarten. He considered that children should be given chances to learn about their self-ability, talent, and their environment before they enter the public school. Froebel described children as plants and teachers as gardeners, the term kindergarten emerged, kinder meaning child and garden meaning garden (Headley, 1965). In his school, Froebel (1974) emphasized play, which started with simple activities and later progressed to more complex games. He felt that children should learn through play.

## 3. Literature Review

### Teaching Vocabulary to Young Learners
Vocabulary is one of the main aspects of any language that plays an important role in building the four skills in English. Oxford (1990) claims that vocabulary is the most sizeable and unmanageable component in learning of any language, whether a foreign or one's mother tongue, because of tens of thousands of different meanings. Developing vocabulary will be great if it can be started from a young age. According to research it is more effective if children start to experience and hear the language when they are small.

In general, it is agreed upon that children learn languages faster and easier than adults because their language center of the brain is still developing and they do not have any worries or responsibilities. Also, they are better at learning any language when they are exposed to it naturally for a long-term. They are great word learners. They have some special characteristics that can make them easier in learning vocabulary. Children cannot learn by themselves; they need a good teacher to facilitate them in learning.

Nation (1974) claims that teachers should facilitate vocabulary learning by teaching learners' useful words and by helping learners figure out meanings on their own. He also states that learners perceive the form of the words by dint of three different senses; visually, tactilely, and aurally. Playing games is a useful and enjoyable method to teach vocabulary to children because they are hyper, physically active. Games help children learn vocabulary effectively without boredom and acquire the lessons easily. According to Allen (1983), games are important in teaching vocabulary because they highlight the necessary and important words to achieve the objectives of the game. Huyen Ang Nga, (2003) and Uberman, (1998) agreed that games create a fun and relaxed atmosphere where young learners could learn fast and retain words better. For example, children benefit most from games which require moving around, imitating a model, competing between groups and the like (Siek-Piskozub, 1994, p. 38). The statements above mean, vocabulary is important to teach and teachers must try to find the most effective games to teach vocabulary that help to avoid lack of motivation or interest in class and children's reluctance to participate in class activities. If games are chosen and used properly, with well-defined aims, they can be an amazing tool in the language teachers' hands. Many

games for children are played to reach or revise a certain vocabulary or language structures. Some games are indoor and some outdoor, some quiet and some noisy, and it can be moving, sitting, or standing. But the main aim of using games should be to set an atmosphere in class in which students can have fun, but most of all an atmosphere in which they will participate willingly and do not realize that they have learnt something.

For them, the learning process should happen incidentally in which children can enjoy their favourite activities and learn a new language at the same time. Children will find them more enjoyable, be more motivated and remember the language better. Moreover, teachers should remember that children are learners who love to play and learn best when they are enjoying themselves. The writer conducts the study to examine how effective the sample of games below in teaching vocabulary.

*Table 2. Vocabulary Games for learning and revising vocabulary*

| Name of Game | Description | Skill/Language Areas | Number of Players | Age Group |
|---|---|---|---|---|
| 1. Switch your places | Students are divided into pairs; they are given the same flashcard with the keyword. Four students stand on the left, four students stand on the right facing each other. (2 meters distance at least). When teacher calls out the word students having the same flashcards representing that word running and changing their places. Speed can be increased to have more fun. | Cooperation; Vocabulary Learning; Pronunciation. | Best played with 8 students | 4-5 |
| 2. Bowling | The flashcards representing the keywords are tacked to the skittles. Students are given the balls and they should roll the ball towards the word called out by a teacher. | Motor skills; Vocabulary Learning; Pronunciation. | Any number | 4-5 |
| 3. Run to me | Flashcards are fastened to students' clothes when teacher calls out the word the student who has that flashcard is running towards the teacher and hits her/his hands. Speed can be increased to have more fun. | Vocabulary Learning; Pronunciation | Best played with 4 students | 4-5 |
| 4. Pull the Rope | Flashcards are taped in the middle of the ropes and placed on the ground facing up. E.g., 4 flashcards *4 ropes. Two chairs for each flashcard. Students are turning around while music is playing and when a teacher pauses the music, she/he calls out the word and the student who sits on the chair and pulls it first under the chair is a winner. | Vocabulary Learning Pronunciation | Best played with 2 students | 4-5 |
| 5. Mingle, Mingle | Students make a line in a straight row and each given a flashcard faced up on the ground. One commander student is standing faced back to them and says mingle several times at that time students are changing their places when the student standing faced back says stop and calling out one of the keywords, the student who has that flashcard joins the commander student and etc. The game finishes when there is one student left, that student is a winner. | Vocabulary revision | Best played with 6 students | 4-5 |

## 4. Method

This study is conducted in the form of a survey. It is descriptive in nature. To describe how vocabulary games work in teaching vocabulary, an observation sheet which focused on the number of correct and incorrect answers provided by children during a vocabulary revision game, checklist to answer each question in the research question were used.

Non-participant observation technique was used in the study that is the writer did not take part in teaching-learning activities but only observed the teacher and the students.

## 5. Participants

The participants of the study were fifteen students and two English language teachers of the kindergarten. Learners were at age of five or six. Children have seven hours of English language lesson every week which are taught by two different teachers who are coded as Teacher 1 and Teacher 2. All the participants started their English classes at age of three, so they have been learning it for two years. All children had no contact with English outside classroom. There were no children with special educational needs.

## 6. Procedure

The writer and Teacher 1 acted as observers while Teacher 2 employed games in teaching vocabulary. Before starting to teach children's knowledge of the 8 keywords to be learned was assessed by representing the pictures of the new keywords. If the child knew the English equivalent of any of the keywords, they were asked to say it out loud.

If students did not know it, they were asked to indicate that by saying "I do not know".

None of the children recognized/translated correctly English equivalents of the keywords to be learned. Afterwards, the teacher represented the children an image of each word, and asked them to say in Turkish what it represented. The pictures were represented in a different order than the previously represented keywords. All students were able to identify correctly and say the Turkish word for the pictures represented by the teacher. After that Teacher 2 started to present the new keywords. The picture of each keyword was represented and the correct pronunciation of the English keyword was sounded out. All words were presented 3 times each. Then teacher started to teach four keywords via vocabulary games for two sessions. Thereafter, she employed a vocabulary revision game to assess how well students learnt the new keywords. The following two sessions she taught the other four keywords via vocabulary games, then again, she played a vocabulary revision game to assess how well students learnt them.

Teacher 1, who observed the learning process and students' behaviours was given a checklist which is given below in Table 2.

*Table 2. Checklist for Teachers about Vocabulary Games*

| № | Statement | All of the Students | Most of the Students | Half of the Students | Few Students | None of the Students |
|---|---|---|---|---|---|---|
| 1 | Students are having fun while playing a vocabulary game. | v | | | | |
| 2 | Students actively participate in playing a vocabulary game. | | v | | | |
| 3 | Students look bored while playing a vocabulary game. | | | | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Students follow the vocabulary game while their friends are playing. | v | | | | |
| 5 | Students display more understanding of vocabulary when they learn through vocabulary games. | v | | | | |
| 6 | Students raise their hands to participate in playing the vocabulary game. | | v | | | |
| 7 | Students actively comment about the vocabulary game. | | v | | | |
| 8 | Students complain while they are playing the vocabulary game. | | | | | x |
| 9 | Students have memorized all the new vocabulary taught via the vocabulary game. | | v | | | |
| 10 | Students are quiet and do not participate in the vocabulary game. | | | | v just one | |
| 11 | Students are relaxed with the teacher while playing a vocabulary game. | v | | | | |
| 12 | Students want to participate in playing vocabulary games several times. | | v | | | |

## 7. The Research Outcome

According to the results from observation checklist, Teacher 1 thinks that the used vocabulary games could attract the students' attention in learning activity, only one student was quiet because he is introverted in nature. It could be seen from Table 2, that the atmosphere in teaching and learning is getting more active while playing games.

Table 2 indicates that most of the students were eager to participate in playing vocabulary games. According to the results from observation sheet, during a vocabulary revision game 13 learners provided correct responses and 2 learners provided incorrect responses.

## 8. Discussion

Observation of the class with fifteen learners showed that Teacher 2 did not employ the use of mother tongue in teaching vocabulary and giving instructions about how to play a vocabulary game. Teacher 2 provided explanation of the game in the target

language and students displayed understanding because first she demonstrated herself how to play the vocabulary game. Teacher 1 believes that while playing vocabulary games all students were having fun. The answer given by Teacher 1 proved that all students actively participated in playing a vocabulary game and none of them was bored.

Moreover, all students were following the procedure of the game while they were waiting for their turn to play. Students displayed understanding of the keywords and most of them were commenting about the game. Furthermore, all students were relaxed with their teacher while playing however, there was one student who was quiet and did not raise his hand to play the vocabulary game. Table 2 shows that most of the students could memorize the keywords.

## 9. Conclusion

Playing vocabulary games provide an enjoyable, comfortable atmosphere so that it works on students successfully. The result of this research showed that the games which have been employed by the teacher could improve very young learners' achievement in vocabulary learning. Therefore, five sample of games which have been employed to teach vocabulary in this study are possible to be applied again. For instance, in teaching young learners aged 5 years old vocabulary games can be played without using a mother tongue. There is misconception like using vocabulary games a lot can only make students feel hyperactive, thus, they do not learn anything. In the case of very young learners playing games can increase students' concentration. As long as the teacher knows the aims and objectives of the game it is considered as a valuable pedagogical tool in learning vocabulary. The important point to be considered by the teacher is whether or not particular games are appropriate for his or her students, how children react to a particular game. Nation (1928:27) states that a good vocabulary teaching technique has the following things: a) it interests the learners; b) it makes the learners give attention to the form meaning or use of the words; c) it gives a chance for repetition.

In fact, the results of the study obtained showed that teaching vocabulary via games was entertaining and effective. However, the study had its own particular weaknesses, the data obtained cannot be used as a fully reliable source of reference because of its limited character. It can, though, be used as a background and an incentive for further exploration of this thematic area modifying the conditions of research which might generate more reliable results.

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# Higher Education

# Attitudes Towards Multiple Choice Questions among Business Students

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## Abstract

*The choice of assessment design in higher education has been a topic of scholarly discussion for decades. This study is from a business school in Norway. In the introductory courses, there are more than 600 students with different instructors. The exam form has mostly been four hours of constructed response (CR) questions, but in some courses, multiple choice (MC) tests are included as a part of the assessment. There is currently a debate about whether to increase the use of MC. The purpose of this paper is to explore students' attitudes towards MC by asking 130 undergraduates. Results indicate that students prefer a combination of those two test formats. They want MC to be a complement to CR, but they do not want MC to replace CR completely. MC questions will reflect the students' knowledge of the subjects to a lesser degree. It will probably change the students' learning strategy, where one emphasises details more than understanding. Furthermore, there is a substantial gender difference. The males have a more positive attitude towards MC tests, and to a greater extent than females, they will adjust their behaviour if the exam format is changed.*

*Keywords: Multiple choice test, business school, gender, Independent-Samples T-test*

## Introduction and Literature Review

Multiple choice (MC) tests have been popular in recent decades and have partly replaced the traditional essay questions in many fields. There are advantages of MC questions, especially in the context of large enrolment (Simkin & Kuechler, 2005). This design requires fewer resources and ensures equal treatment of the students' performance. Therefore, the pressure is to substitute the traditional 4-hour final essay exam with a multiple-choice test among business students in Norway. Some of the disadvantages include the difficulty in constructing good questions, and that MC does not promote critical thinking and analytical skills. Furthermore, MC does not improve the students' written expression skills. The students can show more originality and go deeper in their understanding by writing essays. In the prior literature, a number of researchers have compared MC with CR (Becker & Johnston, 1999; Chan & Kennedy, 2002; Simkin & Kuechler, 2005). The discussion is linked to Bloom's taxonomy of educational objectives (1956).

The purpose of this paper is not to analyse if MC can replace CR, but to find out the attitudes among the students about the use of MC questions to determine their final written grade in business courses. The literature shows that the preferences among the students are mixed. Nield and Wintre (2007) investigate the psychology students' views of MC and other test methods. The majority of the students prefer short-answer questions instead of MC, since they are less frustrating and offer the opportunity to explain their answers. When asking high school students, Zeidner (1987) concluded that

most of them preferred MC over CR exams. It gives less anxiety, is fairer, there is no need to explain the answers, and students expect higher grades. The study conducted by Birenbaum and Feldman (1998) concluded that the social sciences students' favouring of assessment tests depends on the students' academic skills. Those who perform poorly and have low confidence desire an MC test, and those with academic success and with high confidence wish to have a CR test.

There seems to be a gender gap depending on the test methods. It appears that MC questions are favoured by the male students (Becker & Johnston, 1999; Livingston & Rupp, 2004).

## Methodology

### *The Sample*

The sample consists of 131 students (52% female and 48% male). The questionnaire was distributed among the students attending the last lecture in the second-year compulsory macroeconomics course in autumn 2019. The data might be slightly biased, since about 30% of the students were absent on the day of the survey. Nevertheless, the survey gives a picture of those who choose to attend the lecture. For about 60% of those students, the data can also be mixed with administrative data (performance in macroeconomics, grade point average, etc.).

### *Instruments and Test Methods*

In most business courses, the final 4-hour written exam consists of essay questions.

In macroeconomics, 25% of the assignment includes multiple-choice questions. The students were asked in the questionnaire about which mix of MC and CR they prefer.

Other questions were about how MC tests would affect their effort, knowledge, study habits, anxiety, motivation, and other factors. A 7-point Likert scale was used (from 1 = strongly disagree to 7 = strongly agree). The chosen statistical methods are comparing means by using independent sample t-tests and analysing correlation between two variables (Pearson correlation and chi-square test).

## Findings and Discussion

### *Do the Students want MC tests?*

Most of the students prefer only a small part of the final exam to contain MC questions (see Figure 1). The participants wish to a lesser extent to have MC tests in mathematics than in management. There is not an obviously reason why there is a distinct difference between those two courses, since it might be more challenging to design proper MC questions in management than in mathematics.
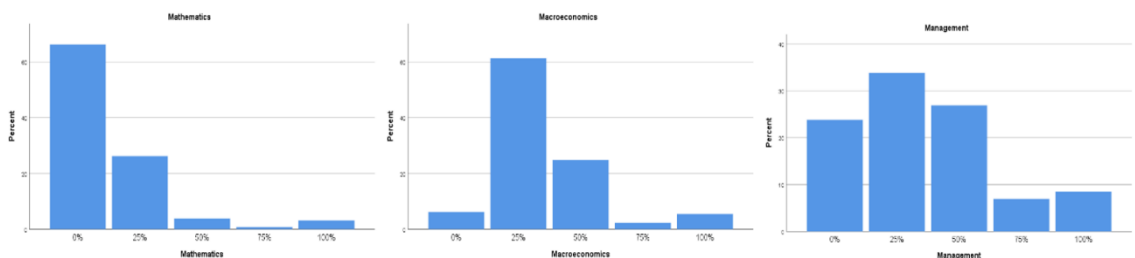


*Fig. 1. Students' preferred percent of MC questions in the final exam*

In macroeconomics, the majority of the undergraduates gives the combination of 25% MC test and 75% CR test the first priority. This is identical to the actual distribution of the written exam for the last 10 years. According to Van de Watering and colleagues (2008), the students' choice seems to depend on what they are used to. Unlike Nield and Wintre (1986), Watering *et al.*, did not find any link between success in MC tests and the desire for more MC questions. Our data suggest that there is no significant correlation between the preferred share of MC questions and performance in MC (Table 1). Note also that the link is negative, and not positive as expected. However, there is a significant negative relationship between success in essay questions and the total score and level of preferred MC questions. Undergraduates achieving high scores in essay tests and CR-designed exams tend to dislike MC exams. This result is to some degree in line with the study conducted by Nield and Wintre (1986).

Females tend to have less success than males in MC questions and accomplish more in CR tests. Still, Table 2 does not indicate any significant gender difference in the preferred assignment form.

| Performance | Students' preferred percent of multiple choice | |
|---|---|---|
| | Pearson Correlation Coefficient | Significant level |
| MC | -0.180 | 0.119 |
| Essay only | -0.238 | 0.037** |
| Total score | -0.327 | 0.004*** |
| | N = 77, Notes: *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively | |

*Table 1. Preferences and performance*

| Preferred percent of multiple-choice test at the final exam | Performance | | |
|---|---|---|---|
| | Female | Male | All |
| 0% | 5 | 3 | 8 |
| 25% | 42 | 34 | 76 |
| 50% | 16 | 14 | 30 |
| 75% | 0 | 3 | 3 |
| 100% | 2 | 5 | 7 |
| | 64 | 59 | 124 |
| Pearson chi-square value 5.48, Significance level:0.24 | | | |

*Table 2. Preferences and gender*

### Attitudes Towards MC Exams

Table 3 presents the attitudes among the students towards introducing only MC exams. This will influence their study habits. Most of the respondent's report that they will emphasize more details (mean = 5.03), will acquire the knowledge differently (mean = 5.14) and change how to prepare for the final exam (mean = 5.48). This is in the line with previous literature. Zeidner (1987) suggests that it is easier to prepare for MC exams than for essay exams. Simkin and Kuechler (2005) verify that MC-based exams will change students' learning styles.

| | Mean All | Female | Male | Difference | T-value Assuming equal variance) | Significance Level |
|---|---|---|---|---|---|---|
| **Effort:** | | | | | | |
| More effort | 3.33 (1.63) | 3.09 | 3.69 | -0.61 (0.29) | -2.11 | 0.037** |
| **Knowledge:** | | | | | | |
| Catching up knowledge | 3.05 (1.64) | 2.70 | 3.54 | -0.84 (0.29) | -2.94 | 0.004*** |
| More learning outcomes | 3.45 (1.52) | 3.03 | 3.98 | -0.93 (0.26) | -3.67 | 0.000 *** |
| Emphasizes more details than understanding in the subject | 5.03 (1.60) | 5.12 | 4.79 | 0.33 (0.25) | 1.15 | 0.25 |
| More knowledge and I will remember more | 3.48 (1.63) | 3.13 | 3.92 | -0.78 (0.29) | -2.74 | 0.007*** |
| **Study methods:** | | | | | | |
| Changing how to acquire knowledge | 5.14 (1.46) | 4.63 | 5.75 | -1.12 (0.24) | -4.72 | 0.000*** |
| Change my preparation for the final exam | 5.48 (1.34) | 5.31 | 5.63 | -0.32 (0.19) | -1.33 | |
| | | | | | | |
| **Anxiety:** | | | | | | |
| Less Anxiety | 3.97 (1.74) | 3.60 | 4.41 | -0.82 (0.30) | -2.69 | 0.08 * |
| **Fairness:** | | | | | | |
| More fairness | 3.17 (1.66) | 2.79 | 3.68 | -0.89 (0.29) | -3.08 | 0.003*** |
| **Motivation:** | | | | | | |
| Increased motivation | 3.60 (1.68) | 3.36 | 3.97 | -0.61 (0.30) | -2.03 | 0.045** |
| **Success:** | | | | | | |
| Unchanged success | 3.39 (1.57) | 3.21 | 3.58 | -0.36 (0.28) | -1.29 | 0.2 |
| N | 131 | 66 | 59 | | | |
| | Notes: *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively | | | | | |

*Table 3. Values, gender difference and independent sample t-test,
using 7-point Likert-scale*

For many of the items, the mean value score is between 3 and 4. The respondent's view is divided. Some of the students agree, while others disagree, see for instance figure 2 of the impact on anxiety and motivation of more MC-questions. Linking this to the students' desire for MC exams, there is a strong significant connection for the courses in macroeconomics and management (Table 4). Undergraduates who are more anxious about MC questions prefer other types of exams. This confirms the findings of Birenbaum and Feldman (1998).

This study shows a significant connection between motivation for the MC questions and the desire for more of this kind of exam design (Table 4). The result is consistent with a rational student's behaviour and choices.
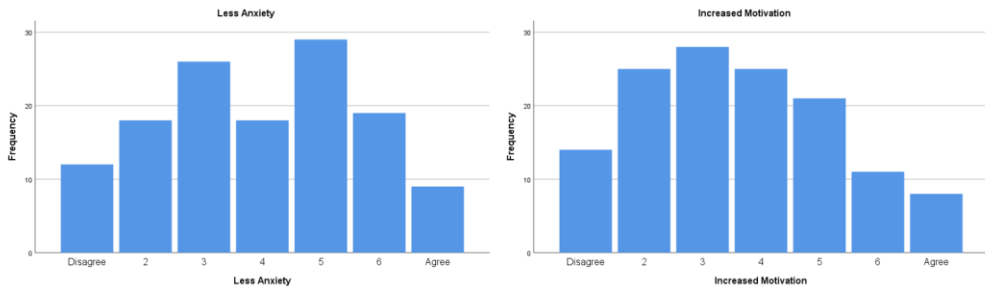
*Fig. 2. Effect of more MC questions*

| | Students' preferred percent of multiple choice | | | |
| --- | --- | --- | --- | --- |
| | Macroeconomics | | Management | |
| **Attitudes towards multiple choice** | Pearson Correlation Coefficient | Significant level | Pearson Correlation Coefficient | Significant level |
| Less Anxiety | 0.561 | 0.000*** | 0.189 | 0.032** |
| Increased motivation | 0.640 | 0.000*** | 0.347 | 0.000*** |
| | N = 129, Notes: *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively | | | |

*Table 4. Pearson correlation coefficient*

Similar to the research of Nield and Wintre (2007), this study indicates a significant gender difference in the attitudes towards MC exams. There is almost a strong gender gap for all factors presented in Table 2. Males are obviously more positive about MC-oriented exams than females. This is in line with previous investigations. This is probably connected to personality characteristics and preferences.

## Concluding Comments

The students report changes in their methods of learning with introducing of MC-type exams. Secondly, there is definitely a gender gap. Thirdly, the undergraduates are pleased with CR questions, and most of the students do not push for more MC questions in courses like mathematics and macroeconomics.

Further research could investigate whether changes in study patterns can affect the qualifications of the undergraduates. More investigation is needed to find out why the students report differently, and especially why there is a gender difference.

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# COVID-19 Outbreak: A Critical Reflection on Teaching

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## Abstract

*This paper addresses the challenges faced by the author in preparing for a fully online learning environment for her students. Making its first identified case in December 2019, COVID-19 has not only change how people work, it has also changed the way businesses and education are conducted. Labelled as the new normal, 100 percent online learning requires a different level of commitment from educators and students alike. Given that the author has not had the experience of 100 percent online teaching, it is interesting to investigate the reflections that come with the experience. A mixed method approach is adopted for this paper, where qualitative data come from the author's observations and documentations of her online activities and materials whilst conducting online teaching. The quantitative data come from a short survey completed by the author's students on their new normal in learning. Preliminary findings are threefold, including the duration of online learning is slightly shorter than face-to-face sessions, students are learning mostly asynchronously, and the author faces difficulties in selecting and curating online teaching materials. What can be discerned from the experience and reflection is that the new normal of learning has certainly challenged educators around the world; the author is pushed to learn, relearn and unlearn her pedagogical skills.*

*Keywords: COVID-19, critical reflection, new normal of learning, online learning, online teaching, panicgogy*

## 1. Introduction

This paper is a critical reflection of the author's teaching journey during the COVID-19 outbreak. Making its first identified case in December 2019, COVID-19 has changed how students and educators alike view online learning. Especially in Malaysia, the higher learning institutions are now faced with massive challenges in order to prepare for the best learning and teaching environment for the students and educators. Labelled as the new normal, 100 percent online learning (and teaching) requires a different level of commitment from both educators and students. Given that the author, who is a teaching member at the NDUM, has not had the experience of 100 percent online teaching before, this paper aims at investigating the reflections that come with the experience.

The NDUM or National Defence University of Malaysia is the only tertiary military institution in Malaysia. The student population consists of about 65 percent military cadets and 35 percent civilian students. It is a residential campus since 98 percent students live on campus. Nonetheless, in order to control the spread of COVID-19, the government has enforced the Movement Control Order (MCO), which started from 18th March 2020. During this MCO, all students including the military cadets are allowed to be with their families. Since then, the author has embarked on teaching fully online.

The author only has one active course that she is teaching for the semester. When

the MCO started, it was the fifth week of the semester. The course involves second year students of the Bachelor of Social Sciences (Languages and Cross-Cultural Communication). Up till this paper is written (which is during the Conditional Movement Control Order – CMCO, starting 4th May 2020), the students have undergone nine weeks of online learning. As this paper focuses on the author's critical reflection of her teaching strategies and tools utilised, two research questions will be answered at the end of this paper. These include, firstly, what are the platforms, tools and applications used for her online teaching, and secondly, what are the challenges faced by the author when embarking for the first time teaching fully online.

Before this paper proceeds, an overview of the paper is apt. This paper has five main sections including this introduction. The next section presents the selected literature on tools and strategies for online teaching and learning. Next, the third section briefly explains the methodology adopted for this paper. This is then followed by the findings and discussions. The last section closes the paper with suggestions for future research and lessons learnt.

## 2. Selected Literature

This section focuses on the tools and applications that are argued to be suitable for online teaching and learning. Of all these tools and applications, some have been utilised by the author during this trying time for her online lessons.

In an attempt to create authentic learning experiences for students in online course delivery, suitable activities and relevant tools are important [1]. Bloom's Taxonomy has been used to design and develop teaching outcomes and activities for many years at the NDUM. Fig. 1 presents how each level of Bloom's Taxonomy can be used with appropriate digital applications and tools.
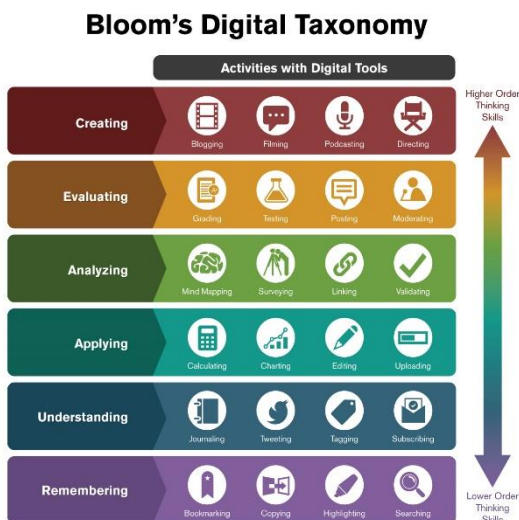


*Fig. 1. Activities with Digital Tools for Levels of Bloom's Taxonomy [1]*

Choosing the right applications and tools for content delivery online may be challenging, but it is possible. Being the first to be affected in the world, China requires effective and efficient strategies to continue schooling. Responding to this, a group of researchers propose quick solutions for online education or what they term as flexible

education in order to ensure learning remains. For synchronous live teaching, educators are encouraged to opt for Rain-classroom, Tencent Ketang Chaoxing Learning APP, ClassIn, CCtalk, UMU, and for social communication, they use QQ Group and Wechat.

For meeting, they choose Welink, Dingtalk, ZOOM, FEISHU and TED Conversations.

Teachers affected by COVID-19 outbreak too take advantage of using available online course platforms, including icourse, edX, Coursera and Udacity [2].

Alternatively, asynchronous teaching uses course sharing platforms such as icourse, edX, Coursera, Udacity; regional MOOC platform, CNMOOC; local university MOOC platform, UOOC; Tsinghua University MOOC platform, XuetangX; and Peking University MOOC platform, CHINESE MOOCS. Some educators also opt for enterprise online course platforms such as Zhihuishu and unlearning [2].

In addition, Table 1 compares strategies and tools that could be used online by educators when planning for their teaching activities [3]. What could be concluded from the table is that learning will not stop unless educators and students refuse to continue with teaching and learning, respectively.

*Table 1. Strategies and Tools for Synchronous and Asynchronous Learning*

| Activity | Synchronous | Asynchronous |
|---|---|---|
| Blogging and Vlogging (creating video blogs) | | / |
| Collaborative writing or story making | / | / |
| Content production (word processing, spreadsheets, etc.) | / | / |
| Discussion forums or text-based chats | / | / |
| e-Portfolios | | / |
| Games/Gamification | / | / |
| Intelligent tutoring (online teaching and assessment tools) | | / |
| Live video chats | / | |
| Mapping (mind-mapping, using interactive maps and charts, etc.) | / | / |
| Multimedia presentations | / | / |
| Online drawing and drafting | | / |
| Plagiarism checking (to provide feedback) | | / |
| Quizzes and surveys | | / |
| Video chatting and conferencing | / | |
| Video creation and sharing | | / |
| Virtual gallery walks | / | / |
| Virtual reality scenarios | / | / |
| Wiki building | | / |

Furthermore, Boon [4] proposed the importance of creating educators' presence in an online learning and teaching environment. According to her, there are various facilitation strategies that would allow students to feel more engaged in their learning.

These strategies are summarised in Table 2. It can be concluded from Table 2 that despite suggestions listed by more experienced online educators, some of these may not be suitable for the author for reasons analysed in the later sections of this paper.

*Table 2. Selected Facilitation Strategies*

| What to do? | How to do? | Online tools to use |
|---|---|---|
| Offer synchronous online office hours to support student learning and knowledge development | • Face-to-face meetings<br>• Telephone consultations<br>• Online audio/video | • Collaborate (Blackboard Learn)<br>• Skype<br>• Google Hangouts |
| Engage in personal communication with students, individually or as a group | • Email greetings<br>• Posted or recorded welcome messages (audio or audio + video)<br>• Post announcements on the course page | • Email<br>• Blackboard Video Tool<br>• Other lecture capture software<br>(such as Camtasia, Mediasite) |
| Provide recorded lectures and assignment explanations | • Audio + video (highly recommended)<br>• Audio only (at minimum) | • Mediasite<br>• Audacity (audio only)<br>• Screencast-o-matic<br>• PowerPoint (with audio) |
| Provide direct (synchronous instruction) | • Develop seminar or lecture courses<br>• Facilitate meetings with students<br>• Set up student group work space | • Google Hangouts |
| Interact regularly with students, individually or in groups | • Email<br>• Participate in online group discussions<br>• Conduct chat sessions with individuals or groups | • Collaborate (Blackboard Learn)<br>• Google Hangouts |
| Create a positive learning environment to stimulate learning | • Show respect for students by appropriate conversational tone and word choice | • Email |

## 3. Methodology

Data for this paper were collected both qualitatively and quantitatively. As this paper records the author's reflection of teaching fully online due to COVID-19 pandemic, critical reflection is used as the method of inquiry to document the experience of the author for the past nine weeks from 18th March to 19th May 2020. According to Morley [5], in order to critically reflect on a situation, a project, research problems, a theory and discussions are needed. This paper has all with the exception of a theory to underpin the analysis and discussions. Nonetheless, the author argues that despite missing a theory, this paper is able to reflect and discuss the issues at hand since it uses just the author's personal reflection and experience. Alas, the author would like to highlight 'panicgogy' as an approach to address the impromptu drive for teaching fully online. This term is explained more in the last section.

Quantitative data were gathered through a short survey distributed to the author's students. These students too are first timers to 100 percent online learning. There were only three questions asked, and they were all manually analysed for frequency and percentages.

## 4. Findings and Discussions

This section answers the research questions posed earlier. Based on personal observations and experiences, together with the students' responses to the three questions in the short online survey, the author sums up that her teaching practices during the outbreak are as such.

### 4.1 Platforms and Tools Used for Teaching Fully Online

The platforms, tools and applications utilised during the nine weeks of teaching fully online are illustrated in Table 3. It can be concluded from the table that WhatsApp is the most popular platform used by the author. This is because based on the survey done on the students, the majority of the students is facing accessibility problems, including poor Internet connection and low data subscription (31 students or 74 percent). At the same time, 27 students (65 percent) prefer the use of WhatsApp for an easy and hassle-free online learning.

*Table 3. Platforms, Tools and Applications Used*

| Platforms, Tools and Applications | Sessions & Bloom's Digital Taxonomy | Comments |
|---|---|---|
| WhatsApp <br>• Voice Note <br>• (send) Images <br>• (send) Video Nuggets | • First session – Monday <br>• Posting | • WhatsApp is used because it requires low Internet data consumption, and it is easily accessible/connected <br>• Voice Note is used to ensure that students are active during the session <br>• Text message allows for reflection |
| Toonly (to develop video nuggets) + ClipChamp | • First session – Monday | • Toonly uses animation to attract students' attention <br>• Videos are below one minute each to ensure low Internet data consumption <br>• ClipChamp is used to reduce the size of each video |
| Loom | • Throughout the week | • Screen recording of 'How To' series for the students; Videos are uploaded on the Learning Management System (LMS) and shared on WhatsApp too |
| Kahoot | • Throughout the week | • Quizzes are developed and students are put into challenges (a few days are given to complete the challenges) |
| Microsoft Teams <br>• Microsoft Assignment | • Second session – Tuesday | • Video conferencing facilities are used to demonstrate issues in students' writing tasks <br>• Assignment is used for revision quizzes |
| Google Forms | • Second session – Tuesday | • Revision quizzes |
| Exam.Net | • Second session – Tuesday | • Tests I and II <br>• *Final examination (most probably)* |
| Al-Fateh e-Learning Portal – LMS <br>• Notes <br>• Videos <br>• Chat Room <br>• Forum | • Throughout the week <br>• Second session – Tuesday <br>• Mind mapping, Editing, Posting | • The main source of online materials (the author relies on this previously for her flipped classroom strategies) <br>• Online materials include videos, SCORM, lecture notes, reading materials and related links |

### 4.2 Challenges of Teaching Fully Online

After nine weeks of online teaching, three challenges have emerged. The author quickly realises that the hours spent teaching online are much reduced than having face-to-face sessions. The normal contact hours for the course taught by the author is four hours weekly, split into two sessions. With online teaching, the duration for the first session on Monday (following the physical schedule), is reduced from two hours to about one hour and 15 minutes. The same thing happens for the second session; the session is reduced by 30 to 40 minutes. The ability of the students to focus becomes lesser online, possibly because they require high motivation and self-discipline. Arguably too, the lesser hours are because students become passive most of the time.

Secondly, the author observes that some students may have to learn asynchronously due to poor Internet connection. Often during the scheduled sessions, only about 27 to 35 students would appear 'live' online from the total of 42. For example, when the WhatsApp log is monitored progressively, the author finds that the number of students reading the messages or watching the video nuggets has increased. What they may be missing is just participating during the live sessions; they could still listen to all Voice Notes, or read the forums and chats. The turnout for quizzes is promising, but then again, the trend is similar to online scheduled sessions. As to the challenges by Kahoot, students are given five to six days to complete, and if they missed the due date, then they would not experience the challenges of answering fun quizzes!

Thirdly, the author has to admit, albeit painfully that she faces massive tasks to choose and curate the best possible teaching and learning materials for the students.

These materials must be able to stand alone, without any support from face-to-face or physical sessions to give further explanation. As a first timer to teaching 100 percent online, the author starts adding the materials to be used by exploiting video nuggets, 'How To' videos, and using various quiz platforms such as Kahoot and Google Forms.

The author opines that her 'presence' is imperative to motivate students to continue with online learning. One way of maintaining her 'presence' is by recording videos with herself in them! Nevertheless, are all these sufficient for the students?

### 5. Conclusion

Could it be that the author succumbs to 'panicgogy,' a state where she is thinking of how to teach with the most appropriate materials and tools hastily? The author opines that, despite being actively involved in flipped classroom for the past six years, she is taken aback by the differences in conducting fully online teaching because materials, delivery methods and online presence are crucial in ensuring that the students are not at a loss. An immediate research must be conducted though, to examine the platforms and tools used during the MCO. The readiness of other educators, who may have experienced 'panicgogy' too must be investigated. To conclude, the author needs to be more creative in delivering the lessons of the week, whilst at the same time trying to ensure that students get what they are supposed to be getting, and ultimately, achieve the course learning outcomes. In this case, the author must learn, relearn and unlearn!

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# Data Loss Prevention in Higher Education

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**Abstract**

*The paper discusses data loss prevention (DLP) in higher education institutions, since data breaches are becoming more and more common in the recent years. Data compromised in higher education extend far beyond personal and financial data, including also sensitive research data. The environment of openness and collaboration between universities, as well as the typical access of many portable devices make access easier for hackers and detection of unauthorized access difficult. We argue that DLP is of high importance for universities, since they work with a variety of types of data, which are subject to different regulations and besides the necessity some of the data to be kept confidential there is also a counter need some of the data to be made available to the public (as results of academic research for example). The paper discusses how universities can define their critical data, the risks of data loss and strategies to keep their data safe. We discuss 3 main critical data loss prevention objectives, namely personal information protection/compliance, intellectual property (IP) protection and business partner compliance. The most common types of data breaches occurring in the higher education systems are hacking and malware, unintentional disclosure, and portable device breaches. The paper also presents a showcase of how Bulgarian universities address the issues described above.*

*Keywords: data loss prevention, universities, risk management, intellectual property*

## 1. Importance of DLP for Universities

In the recent years there has been a fundamental change in how university staff interacts with information technologies, powered by hardware (laptops and smart phones) and services (webmail, instant messaging, social media and remote access).

Access to information remains the lifeblood of universities, but the risk of data loss is still significantly high. Data loss is a serious risk for all universities.[8] Universities are open organizations where people receive education, conduct research and exchange knowledge. At the same time, they process large amounts of sensitive data – personal data, student evaluation data, diploma data, contract information, projects, bank accounts, copyright, etc. [2] This information might be of interest to many individuals/organizations, some of which are deliberately working on malicious use of such information. The threat can come from both internal sources (abusive staff) and multiple external ones (hackers using various forms of phishing, viruses, unauthorized access to databases and servers, etc.). Data can flow from many different points. Loss, dissemination or modification of information can lead to asset damage, financial loss, outflow of students, loss of university reputation, or even bankruptcy. Demanding high security while maintaining educational services creates both challenges and new daily opportunities. [1] In order to prevent data leakage and modification and to minimize the possibility of misuse, it is appropriate to use different combinations of rules, policies and

tools that, when used correctly, significantly reduce the risk of data loss. In this article, we argue that this protection can be implemented through software solutions based on "Data loss Prevention" (DLP). At their core, DLPs are designed to counteract the risk of inappropriate disclosure of information. The main idea of DLP is to monitor and control the storage, movement or processing of data in general and critical and confidential data in particular, according to specific security policies. [7] Proper setup and implementation of a DLP system can perform functions of protection against data loss and unauthorized use of information. According to a research team that described the DLP application at its university the system helps analyse, monitor, track, lock and protect data. [2] The joint use of encryption and DLP protects a wide range of information: data about students, intellectual property, legal and financial records, correspondence with clients and partners, etc. The main position of the authors is that the application of a DLP systems in universities will significantly reduce the frequency of unintentional data leakage, will control vulnerabilities, information security will increase through the encryption capabilities of the system, which in turn will reduce external attempts for abuse.

## 2. Classification of Data Types Used in Universities: Defining Critical Data

Following the legal framework for the establishment and work of universities in Bulgaria [4], university information can be divided into 2 types: **Organizational information**, which is related to the organization, administration and management of the work of the educational institutions and the implementation of support activities. **Research information and information, related to the educational process –** it covers the scientific works, materials, research results developed by the academic staff, regardless of their form, for the servicing of the main activities of the educational institution. For the purposes of this paper, the scope of this type of information also includes scientific works, materials and research results developed by third parties outside the university, which are used in its teaching and research work, when these objects are subject to special regulation of the rights to use them and the university has obligations to protect the information in them (respectively to restrict access to them) at the request of the third party.

In order to implement DLP effectively, it is important for universities to be aware of exactly what information is critical for them and needs to be protected. According to the authors, the critical data of Universities need to include the following:

- Information related to the study materials, the assessment of the students, the diplomas of the students and doctoral students;
- Implementation of regulations of documents that must be protected from leakage, the internal rules of the university, including personal and sensitive data.
- Project documentation – projects on which scientists work at the university, which information is classified.
- Intellectual property rights – patents and related information on the application of inventions, rights to industrial designs, trademarks, know-how, etc.
- Unpublished and unprotected intellectual property materials and research results, the knowledge of which by a third party may compromise the research results or call into question their authorship or allow them to be used illegally, damaging the reputation of the university or blocking the possibility for further research and protection through the intellectual property system.
- Information that the university has acquired in the framework of an agreement with a third party (license agreement, non-disclosure agreement, etc.) and is obliged to limit its use to the scope and persons defined by the third party in the agreement.

## 3. DLP Policies/Strategies for Universities

When working on developing a DLP policy or strategy, universities must regard some main issues to start from:

- First, they need to determine the primary data protection objective: this could be to comply with regulations (and often this is not something left to the choice of each organization, but is specifically envisaged in the legislation); protect the intellectual property of the university or comply with third parties. Of course, depending on the needs of the university and the data it works with all these three objectives can be a part of the university DLP policy;

- Determine the main causes of data loss – one of the biggest challenges in mitigating data loss, is that there are so many reasons attributed to data loss in an organization and there is no tool or a simple solution that adequately address these various data losses. However, to be able to address the risks faced, a solution must be developed to incorporate the causes of data loss, which are can be classified as people, processes and technology. [9]
    - People: Data loss can be caused by people through their lack of awareness of the security issues relating to sensitive information that are to be secured and most times are not been accountable for protecting this information.
    - Process: The process of securing this sensitive information can be caused by inadequate data usage policies, no proper data transmission process and lack of data monitoring usage.
    - Technology: Lack of flexibility and communication platform in technology deployed for the protection of data, makes it difficult for the user, thereby making the user to look for an alternative.

- Define the stages for developing a DLP system in the University – a basic DLP system consists of three stages which includes discover, monitor and protect. [6] The discovery stage locates where the critical data are been stored, by taking a detailed inventory of this data and then regrouping the sensitive data in terms of priorities. In the monitoring stage the organization should monitor how the confidential data are used, by understanding the content and context of this sensitive data and by analysing when a breach occurs. The last stage which is the protect stage, basically describes the ways for protecting data loss and this is done by being proactive in protecting these critical data.

- Define the DLP architecture – in general DLP architectures can be grouped in 4 main groups [3]:
    - endpoint DLP: Endpoint DLP relies primarily on purpose-built software agents, that live on endpoints – laptops, desktops, servers, any device that runs on Microsoft Windows, Linux, or Apple OS X. The agent delivers visibility and, if desired, control over data. Deployment involves installing the agent on machines, where a protection is desired. No agent means no coverage.
    - network DLP: Network DLP, often referred to as agentless DLP, delivers visibility and control of traffic that passes across the network. A physical or virtual machine inspects all traffic, such as mail, web, IM and can then enforce data policies. Deployment is either via a physical appliance or a virtual machine then configuring network traffic to pass through for the inspection.
    - discovery DLP: Discovery DLP proactively scans your network, including laptops, servers, file shares, and databases to deliver a comprehensive

analysis of where sensitive data resides on all these devices. To perform the data discovery some solutions, require an agent to also be installed on the machine being scanned.

o cloud DLP: Cloud DLP, much like Discovery DLP, scans storage repositories and delivers an accurate picture of where sensitive data lives, though as its name suggests Cloud DLP focuses on your data that lives in the cloud. Cloud DLP relies on an API (Application Program Interface) to connect with the cloud storage service (Box, One-Drive, etc.) then scan the content. Cloud DLP sees data as it is being put into the cloud and can perform a cloud storage audit or remediation.

When building a successful DLP strategy and the DLP systems related to it, universities must take into account that the DLP systems cannot function effectively in isolation. For a DLP system to effectively function it requires linking other security information processes as well. However, before implementing any DLP system, there is need to adequately understand what critical data the organization wants to hold, where is critical and confidential data being stored in terms of locations and the destination and the channels this information will pass through. So, in order to make a DLP strategy successful university should consider their own data life cycle. The data life cycle is a detailed outline of the phases involved in effectively preserving and managing of data to be used and reused. These stages include data at rest (data in storage), data in use (data flowing through internal and external networks) and data in transit (data that are been accessed).

## 4. DLP in Bulgarian Universities

The methodology of the research is based on the conducted literature analysis and is organized in the form of a survey. The survey was held in 18 (35%) of the universities in Bulgaria. Respondents are professors, representatives of universities. The survey was organized through a structured online questionnaire, which provides anonymity of the answers, inviolability of personal opinion and ethics and relatively high certainty in the results obtained. [5] The study was conducted in the first half of 2020. It covers the manifestation of various risk situations related to information and data loss for a period of five years ago.

The main fields covered by the study are: the presence of negative experiences related to information and data loss; rules regarding the work with different categories of information, ensuring the protection of information, protection of intellectual property at the university. The methods of descriptive statistics were used for the analysis of the data.

Regarding the problems related to information leakage in the surveyed universities, three main types of sensitive information were identified. The first is related to the data related to the assessment of students and the possibility for the assessments to be manipulated. 35.3% of the respondents have faced this risk in the last five years. Next, the study analyses the data loss related to public procurement, research projects, test materials and more. Although with a smaller percentage (about 12%), but again respondents confirm there is information leakage. Another problem is the forgery of university diplomas – although the percentage is relatively small at around 6%, this risk remains a major threat for the reputation of universities.

The next study area refers to the work with different categories of information, rules and procedures for processing information, its storage and extraction. Half of the respondents indicate that their universities work with clearly defined rules and procedures, through which the different categories of staff have access to the information

necessary for the performance of their work duties. They follow established mechanisms for access, processing, destruction of information. They declare low levels of data leakage. In another 30%, the procedures for working with different categories of information relate mainly to administrative staff, with access to sensitive and classified information. The third part of the answers (about 20%) is worrying, in which the respondents are not aware of the existence of current rules and procedures in this field.

This means that they are missing or are not available at all. This fact significantly increases the potential risk associated with data leakage from universities (see Graph 1).
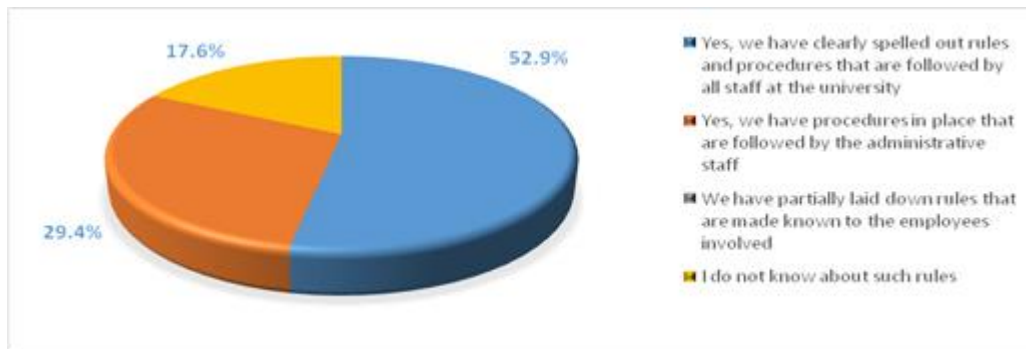


*Graph 1. Existence of rules and procedures for working with different categories of data in Bulgarian Universities*

To determine the extent to which these rules and procedures were actually followed, respondents had to answer a question concerning information classified as sensitive to which they all had access. These are the data related to the evaluation of students and the channels of dissemination of this information. For about 6% of respondents, the possibility of information leakage is limited due to the fact that the exams are conducted electronically, the grades are generated automatically, and the access of the teachers is limited. In almost 30% of the universities surveyed, teachers have access to exam grades and enter them into specific software themselves. Here the potential risk of data leakage or modification is greater, but the protection that is offered is good. The traditional way of entering grades in student books by the teacher is used by about 40% of the respondents. This method reveals various weaknesses in completing, accepting, submitting evaluation protocols. Worrying is the fact that there are still universities where there are cases of sending group emails with names, faculty numbers, and other personal data to students. This type of data dissemination violates the provisions of the GDPR and is in itself a leakage of personal data.

All surveyed universities apply measures to prevent information leakage. Most respondents work with clearly defined rights regarding access to different categories of data. About 35% of them have security software that reduces the possibility of information leakage. Among them (about 12%) rely on the DLP system offered in the present material (see Graph2).

*Graph 2. Prevention of information leakage from universities*

When it comes to the intellectual property the universities own, we can see that 50% of the respondents say that they do not know if the university owns any IP. The people, who know about the IP of the university share that the greatest percentage of the IP is vested in copyrights (44,4%), followed by patents for inventions (38,8%) and utility model certificates (27,8%). Of course, when analysing the results, we must take into consideration the type of scientific work the universities implement, since not all scientific work is related to research and development activities, leading to innovations, which can be protected as inventions, industrial designs, utility models. The more surprising result is that do not recognize the importance of trademark rights as an instrument to be used on the educational market – for being recognized and for building reputation. (See Graph 3)
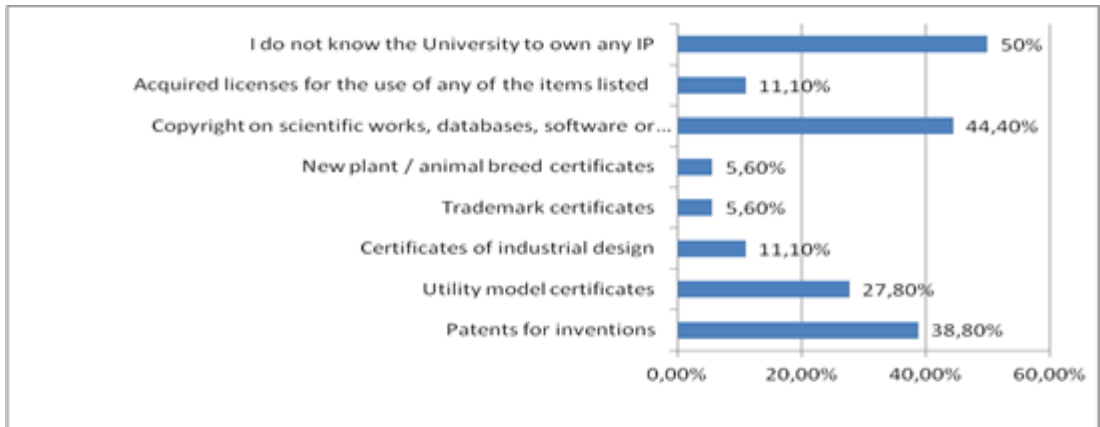


*Graph 3. Intellectual property in Bulgarian Universities*

Related to the IP rights the university owns we wanted to know if the universities have any IP protection policies and measures. We asked employees if they are aware of actions they can and cannot perform in relation to the protected IP objects – if they have been instructed, given rules to follow. But only 50% of the employees answered yes, so Universities still need to work hard in that domain to clearly address IP issues to their employees in order to be able to more effectively protect it. The graphs below show what knowledge employees have in terms of working with the university IP.

As it can be seen from the graphs only a small percentage (around 30%) of employees know about procedures they need to follow in terms of what to do if they

create an IP work/object or to prevent outsiders from infringement of the university's IP rights. Universities must seriously consider this field of DLP, since most of their work is anyway locked in intangibles and if there are no proper measures to implement an IP policy even if there is one, then the risks of breaches and IP infringement increase immensely. Universities also work with a lot of documents with restricted access – 61% of respondents say that they work with such types of documents in their organizations.

However almost half of the respondents (44,4%) say that they can freely transfer information from the university devices they work on to an external device. 28% of the respondents answered that they need a specific permission to do that. The next graph shows what a high percentage of the employees do not know if the university has a system to notify them if there is an attempt by an outsider/outside organization to access their documents or research (over 50%). Yet 61% of employees say that they know who to contact in case of such event. 66,7% of employees consider that it is appropriate for the university to have a DLP system in place to monitor indications of information abuse.

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# Development of Interpersonal Skills to Benefit Interaction and Teamwork in University Students: a Means and Aim in the Learning Process

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## Abstract

*The changes in educational models, based on training founded on skills have brought about an alteration in teaching methodology [1]. Not only is what is taught is relevant but also what can be learnt through reflexion, participation and interaction amongst a group of equals [2, 3]. For this to be possible, a series of transversal skills are required, amongst which teamwork is particularly important [4], but which, despite its importance and use, is generally recognised to be a neglected skill in initial university training [5]. It is used as a methodology but there are inadequacies which make it difficult to take full advantage of it. In this context, among the skills it is necessary to develop interpersonal skills that enable the relationship with others, respect appropriately expressed, understanding of the points of view of others, etc. [6]. This makes essential the design and development of didactic proposals based on knowledge of the factors and capacities that facilitate the acquisition of those skills and help to improve the teamwork carried out [7]. From this perspective, the goal is to design and implement a practical didactic proposal focused on facilitating the acquisition of interpersonal skills by university students. The experiment is developed with students of the first year in the degree of Infant Education of Jaén University and proves the importance of the proposal in achieving interpersonal skills and the contribution to the acquisition of teamwork skills, giving an active role to the student in the process of learning and teaching.*

*Keywords: Interpersonal skills, teamwork, training founded on skills, transversal skills, Higher Education*

## 1. Theoretical grounding. Contextualizations

The changes in educational models, based on training founded on skills have brought about an alteration in teaching methodology [1]. Not only is what is taught is relevant but also what can be learnt through reflexion, participation and interaction amongst a group of equals [2, 3].

For this to be possible, a series of transversal competences is required, among which teamwork stands out [4].This is a skill which has been recognised in all university degrees and is a practice widely used in higher education with which teachers seek to make their classes more dynamic, enabling the student to play a greater role and so facilitating their learning [2].

In spite of its importance and use, it is generally recognised as being inadequately taught in the initial stage of university training [5], since although it is used as methodology, there are omissions that make it difficult to benefit from it fully.

In this context, among the skills it is necessary to develop interpersonal skills that

enable the relationship with others, respect appropriately expressed, understanding of the points of view of others, etc. [6]. This makes essential the design and development of didactic proposals based on knowledge of the factors and capacities that facilitate the acquisition of those skills and help to improve the teamwork carried out [7]. In this way working to develop interpersonal skills has become a means and an end in the process of learning.

From this perspective, the goal is to design and implement a practical didactic proposal focused on facilitating the acquisition of interpersonal skills by university students. The experiment is developed with students of the first year in the degree of Infant Education of Jaén University and proves the importance of the proposal in achieving interpersonal skills and the contribution to the acquisition of teamwork skills, giving an active role to the student in the process of learning and teaching.

## 2. Description of the Experiment

The experiment arose after detecting difficulties throughout my career as a teacher in teamworking in the classroom, as well as the scarce interaction among the students.

To resolve these difficulties and to use the most efficient method of cooperative and collaborative work as a teaching methodology, it was proposed to increase the initial training of university students.

Specifically, the experiment was carried out with 150 students during the academic year 2018/2019 in the subject Processes and educational contexts in infant school teaching which is a subject in the first year of Infants' Education in the University of Jaén.

In particular, it was developed within the model centered on identifying and analysing a group of equals as an educational context.

The aims pursued by the teaching proposal "Training interpersonal skills to benefit teamwork" are:
- To recognise the importance of interpersonal skills
- To identify the interpersonal skills necessary to interact with classmates in the class
- Identify the characteristics of working groups
- Analyse the process of forming groups
- To consider the advantages and disadvantages of teamwork
- To put forward strategies for teamwork in the classroom

To carry out the proposal an active methodology was used focused on workshops and seminars through group dynamics that allowed for interaction, communication and reflection.

The activities were organized around stages of training in the formation of working groups:
- Knowledge of members of the group
- Feelings of affirmation and trust
- Communication
- Commitment and cooperation

After 10 hours of work with the students, the experiment was evaluated through five discussion groups and a questionnaire.

The experiment proved the importance of the proposal in achieving interpersonal skills. In the identification and development of the capacities necessary to achieve such skills, a dialogue and interchange of opinion was created starting with commitment and

responsibility with the group, which in turn encouraged not only interchange but also knowledge and moreover, experience and feelings, which promoted interpersonal communication, giving the major part to the students.

## 3. Conclusions

The proposal succeeded in constructing knowledge and developing capacities of communication, interchange and explanation as well as attitudes of respect, commitment, independence and solidarity. Furthermore, the interpersonal skills proved to be primordial for teamwork and contribute to the acquisition of transversal skills.

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# Distance Learning: A New Perspective to the Future

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## Abstract

*Science and education at the present stage of development, like society as a whole, undergo peculiar modifications. The protracted crisis associated with the epidemic situation in Russia and in the world sharply exacerbated the problems of educating the new generation. Science is obliged to offer particularly balanced rational and pragmatic approaches to address the most urgent practical issues, in particular, the education of a student nowadays. From this angle, the present paper proposes relevant theoretical models for studying the concept of distance education, its place, and its role in the modern scientific community. A program has been developed, taking into account the latest global trends in the theory and practice of distance learning. It is based on new concepts, categories that have emerged in modern science. The information material selected for the study is adapted to the requirements and principles of formative training. The goal of any training course is the transfer of knowledge and practical experience gained to future specialists; the formation of skills necessary to achieve efficiency in the implementation of tasks in the upcoming process of professional activity. The proposed study in the field of distance learning is designed to lay the foundations of critical thinking among students, to form their ability to comprehend the surrounding reality, the skills to adequately make the most effective decisions under the principles of learning. Its subject is the disclosure of the general content of the theory and methodology of distance learning. The course program takes into account the previous training of students and provides the basis for the subsequent deepening of knowledge, abilities, and value orientations. The theoretical and practical blocks of classes are designed to stimulate an independent search for the missing students' knowledge, building on the information received and the practical experience gained at the lectures and seminars of the course within the framework of the online platform. The distribution of the number of hours is dynamic, but conventional, giving the teacher the freedom to choose: either to devote more or less attention and time to specific topics based on the real needs of the students and his/her scientific preferences. An essential condition of the course is the following aspects: the formation of a student as an independently thinking and active person, capable of exhibiting non-standard thinking when organizing a distance learning process in a higher educational institution.*

*Keywords: Distance learning, online platform, training course, schedule*

## Introduction

The existing reality associated with the education of modern students around the world opens up new formats and facets of distance learning. This program is designed for the course "Distance Learning Technique" and allows the transfer of accumulated knowledge and practical experience to future specialists through the digital environment.

Distance learning in the educational process allows the use of sophisticated modern methods, means and training tools based on electronic information technologies. The educational cycle in the form of distance learning should act as a single cohesive mechanism, based on active two-way communication between students and a teacher, as well as intensive independent activity of a student [3].

One of the main objectives of the course is to develop individual approaches to each student, depending on the degree and level of training, logical thinking and other features of each student. The teacher should help students to independently search for new and relevant ways to solve given cases by fixing and analysing the information received and gained practical experience at the lectures and tutorials within the framework of the online platform.

The second crucial task is to create maximum conditions for the formation of students' needs for cognition and research of new information about the object of interest in the framework of the academic discipline. The critical aspect of the above should be considered the "interest," that is, each student's interest in the material being studied, his motivational state, and a clear commitment that encourages cognitive activity.

However, the commitment should be aimed not only at obtaining the final result, but also at the process itself. From this, it follows that the interaction of the teacher with the student in the framework of the discipline through distance learning should be based on the verbal contact, as one of the ways to consistently transmit a rational analysis of the material, contributing to the formation of students' thoughts and ideas. After having found an individual approach to each student in organizing the educational process, the teacher must create the conditions in which the student will be free to think rationally and creatively, freely discourse and have the ability to reason the decisions and conclusions made about specific situations. Thus, persuasion is one of the natural and effective methods of communicative impact in the framework of distance learning, since this method accumulates a personal plan for the transfer of the material under study and the objective reality of perception by the audience. The result of this pairing is a practical result aimed at identifying the specifics of the taught course in digital space.

The third task logically flows out of the second, and its principle is the ability to argue.

According to the research, the argumentation model acts as an active form of student activity, allowing him to actualize himself:

- as an individual declaring his/her communicative position and skills;
- as a future specialist, a professional who involves a whole range of acquired knowledge, ideas and competencies, a system of values and logical activity, a particular format for an argumentative situation.

Thus, the presented model makes it possible to "reveal" in each student the real potential and individual resource, as well as other individual characteristics, which are determined by his capabilities and distance context, which sets the parameters for differentiating and varying means and methods of training [2].

**Qualification Competencies Acquired by Students in the Course of the "Distance Learning Methodology"**

As a result of studying the proposed course, students will be able to know and understand:

➢ Theoretical foundations of training.
➢ Principles of distance learning:
– the didactic principle: it contains general principles of training obtained in the learning process, expressing the relationship of theoretical knowledge and practical skills of future specialists. They include the principles of training, which have a direct impact on the quality and form of organization of educational activities. These principles are those of scientific rigour, accessibility, consistency;
– the principle of conscious and active learning is aimed at the mutual work of the teacher and students in the formation of conscious and active actions in the process of perception and application of the information received. To achieve the efficiency of this principle, it is necessary to be guided by the following rules: the teacher must correctly indicate the goals and objectives of the course being studied so that students clearly understand their essence, importance and significance. The student, in turn, must comprehend and realize each term, category and definition, with which further active work will be conducted. The theoretical knowledge delivered by the teacher needs to be fixed with practical examples, for clarity of their application; the use of an individual approach to each student based on his particular interests, to develop them by selecting specific material for study; to build independent work of students through thinking, analysis of the material provided;
– the principle of individualization is based on designing an individual learning plan for each student, taking into account his level of knowledge, if necessary, adjusting throughout the educational process;
– the principle of dialogue in the process of distance learning is aimed at forming of interesting ideas about the subject of discussion through joint work and communication of the student and a teacher. This principle is nothing more than cooperation, in which the teacher, acting as a moderator, applies methods and ways of making contact, analyses the current situation, formulates a complex of various tasks, and the student suggests ways to solve them. The key feature of educational dialogue is the truth, to which, through joint efforts, its participants come.
– The principle of interactivity that allows each student to be involved in research and educational work. This principle is widely used in distance learning, increasing the efficiency of perception of the material;
– The principle of flexibility is based on the use of remote telecommunication information platforms that allow adjusting the time and place of completing tasks.

**The Goal-Setting Algorithm for Students' Teaching**

*Use:*
– pedagogical models based on the principles of distance learning, defining the purpose, forms, content, means and methods of shaping a future specialist;
– plan teaching activities, set goals and objectives for distance learning, outline short, medium, long-term prospects;

- to carry out teaching activities following the fundamental laws and principles of distance learning;
- if necessary, use a polymorphic distance learning system;
- regulate positively-effective educational activities and the process of students' communication;
- to qualitatively stimulate the active work and behaviour of students;
- diagnose the results in the process of distance learning;
- apply the achievements of digital distance learning tools in practice.

*Analyse:*
- conduct independent research to identify students' competencies in the distance learning system;
- develop autonomous, effective distance learning strategy, choose the optimal combination of classical and current methods and means of teaching students;
- in-depth self-education in the selected course, taking into account the use of digital technologies.

## Methodology and Teaching Methods, Including the Student's Work

The distance learning system uses the following methodological approaches:
- familiarization with the evolution of scientific thought reflecting the specifics and needs of the time;
- increasing the level of knowledge and the formation of scientific thinking [4];
- familiarization with the primary and related disciplines;
- the ability to extract from the variety of scientific sources all the most useful ideas for the formation of professional skills among students.

Methods applied:
- comparative, synthesis, analysis, reproductive and information-receptive educational methods.

The course uses the following forms of organization of the educational process:
- lectures, seminars, business games, training exercises, practical exercises with analysis and self-assessment of thematic situations by students. Independent work makes it possible to include students in a more active and conscious mastery of knowledge.

The distance learning system allows using any organizational form of control, which can be supplemented by individually designed computer programs aimed at active and timely monitoring of academic credentials. Up-to-date information and educational technologies functionally expand the scope of the educational process [1].

## Methods and Forms of Midterm and Final Assessment

Students' current academic credentials are monitored through a survey of homework verification.

The intermediate quality control of knowledge consists of three milestone certification sections, the implementation of practical and laboratory tasks.

At the end of the training course, a final exam is conducted using information and communication communications tools.

**Conclusion**

The dynamics of the development of electronic information resources is gaining new momentum every year, thanks to which the gadgets familiar to a to-date student become not only an entertainment item but can also be used as a productive means of distance learning. Improving the automation of learning processes, allowing the use of various scientific computer programs, telecommunication systems, platforms, electronic sources, forms a specially adapted information and educational environment. Given the current situation, when millions of people were isolated from each other, distance learning was the only adequate and effective way out. It allowed us to continue the educational process without affecting the quality.

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# Educational Models for IP Protection of Business Identifiers

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### Abstract

*Subject matter of this paper is the education in intellectual property protection of business identifiers. The educational model reveals to the student in Master degree the possible strategies for building a company business identity and turning business identifiers into a management resource. Four strategies are presented in the paper and the emphasis is placed on the protection of digital business identifiers as trademarks and industrial designs. Nowadays, when consumers are provided with a limitless variety of goods and services, companies are faced with the challenge to establish a stable market position, to build consumer trust and loyalty. Higher demand and fierce competition lead to price reduction, which requires from a company to differentiate itself from the other companies on the market and to build a positive corporate image, especially in the digital market. One of the prerequisites for success in a state of globalization is the development of a successful strategy for digital business identification by means of a strong trademark and original industrial designs and their proper management. Business identifiers are key means for formation of corporate identity and differentiates a company from its competitors. Moreover, is has been revealed in the paper that building of digital competitiveness is a result of IP protection of business identifiers. On its part, intellectual property as a practical tool outlines the scope of protection of business identifiers, the roles and responsibilities of the participants and the consequences of potential violations. The registration of digital business identifiers as trademarks and industrial designs is not only a mechanism for protection and stimulation of creativity, but also a mean that guarantees investments and market advantages. The above-mentioned educational models are presented in the course "Business Identifiers" before students in Master Degree.*

*Keywords: model, intellectual property rights, digital competitiveness, business identifiers, trademarks, industrial designs*

## 1. Introduction

The aim of this paper is to present the principle methodology for examining business identifiers as well as to explain the main features of educational model concerning IP protections of business identifiers. The developed educational model is result of academic practise and real case studies in the field of IP protection of company business identifiers. The model is presented in the course "Business Identifiers" before students in Master Degree in the University for National and World Economy, Sofia, Bulgaria.

Company business identifiers are a combination of graphic and colour images, linguistic meanings and digital solutions in real or digital environments, through which the company and its products are positioned on the market and differentiated from other business entities and business results.

All of these business identifiers, verbal, visual or combination of those, could be considered as an intellectual product for business purposes. [2] We consider the terms business identifiers and company business identifiers as equal.

## 2. Strategies Concerning Business Identifiers and Their Protections as IP

The theoretical knowledge acquired by the students during the lectures concerns the four main strategies for building a company business identification. The educational model reveals to the students the possible strategies for building a company business identity and turning business identifiers into a management resource.

### 2.1 Strategy for Creation and Development of System of Company Business Identifiers and their Protection as Intellectual Property

The first strategy is based on company research and development in order to create its own business identifiers. The resulting creative endeavours may be protected as industrial property objects (mainly industrial design, trademark and geographical indication) if they meet certain legal requirements. By obtaining protection, business identifiers will give their holder an exclusive right over them, which will be a prerequisite for realizing economic benefits. Which object of the industrial property system to be used as a protection mechanism is a strategically important decision for the company. It should be also considered whether additional protection mechanisms should be used.

Depending on the type of business identifier, on the stage of development of the company and its field of activity, four possible strategic options are formed for the protection of business identifiers as intellectual property.

Option 1: Protection of business identifiers as a trademark.

Option 2: Protection of business identifiers as industrial design, classes 32 (logo and graphic design) and class 14, in particular class 14.02 (computer interface, computer screens) [3]

Option 3: Protection of business identifiers as geographical indication.

Option 4: Combined protection of business identifiers as trademark, geographical indication and industrial design (if possible).

### 2.2 A Strategy for Legally Borrowing, Outsourcing, and Purchasing Company Business Identifiers

If a business entity is unable or unwilling to create and develop a system of its own business identifiers, it has the opportunity to borrow legally, acquire through a license or purchase a foreign business identifier.

- A strategy for legally borrowing business identifiers

Very often, in practice, firms choose the strategy of borrowing already protected business identifiers, succeeding in "circumventing" the exclusive right to an industrial design or a trademark. With legal borrowing, the following options are possible:

Option 1: Use foreign business identifiers for different territories.

Option 2: Use of foreign business identifiers after expiration of protection.

Option 3: Use foreign business identifiers in a different market segment.

- External licensing strategy for business identifiers

The strategy for obtaining rights to use a foreign business identifier for remuneration is mostly used by large foreign companies that own a number of subsidiaries in different territories and use licensing as a mechanism for settling rights between companies. The strategy is also used by companies that operate on a franchise basis.

- Strategy for buying business Identifiers

Except through a license, the company may acquire rights to a foreign business

identifier by purchasing it from a third party. Typically, business identifier sales occur when a company has developed one, but subsequently does not use it. Another possible option is when the company terminates its activity and wish to transfer the rights to the business identifiers to another legal entity.

### 2.3 Strategy for Providing and Transferring Business Identifiers to Third Parties

If a company has created, borrowed or purchased business identifiers that are protected as a trade mark and/or design, it becomes the holder of the exclusive right over them. The economic realization of the business identifiers of the company is not only by using them in the business activity of the business entity, but also by giving them to third parties. It should be noted that business identifiers of a company protected as industrial property can be economically realized in several ways, namely:

- – by use by the holder of the exclusive right;
- – by use by third parties on the basis of a license agreement with the right holder;
- – by sale / transfer of the exclusive right.

Due to the unique nature of intellectual products, the first two of these are not mutually exclusive, on the contrary – the right holder has the ability to allow third parties to use the industrial property under certain conditions, while not losing ownership of it and also having the right to use it. Moreover, the "buyer" of the license may not be one, but an unlimited number of persons, each of whom, together with the owner (right holder), simultaneously uses the consumer value of the licensed intellectual product. Exactly these types of transactions are specific only to the objects of intellectual property.

### 2.4 Strategy for Protection and Management of Business Ids in Digital Environment

In recent years, the way businesses interact with consumers has changed. The development and use of digital technologies have forced companies to quickly adapt to the new environment. The business itself has become a continuous rhythm of change.

Consumer expectations have changed – they want everything to be faster, easier, more affordable and better. The way business identifiers interact with consumers has also changed. The link is much more interactive, and the information both parties receive is enormous. [3] In practice, the digital environment has become an integral part of everyday life.

The digital environment is a virtual, simulated space characterized by rich colours, fast-changing images and attractive design solutions. Many business identifiers in this digital environment are used primarily to build a company website that appears after spelling out a domain name. The only way to fully protect the website is through the registration of the individual subpages and their elements as industrial design in class 14 of the Locarno Classification. It is advisable to submit a multiple application for protection within one year of the creation of the website's vision, which should include all the solutions. If the company subsequently decides that any of the design solutions (icon, emoticon or other) is not appropriate and will not be used, it may proceed with the transfer of the exclusive right to a third party for a fee. As the digital environment is characterized by dynamism, the company could change the look of the website up to the tenth year from the date of application design and before renewal of the registered designs. Renewal costs can be invested in protecting the changed vision by filing a new design registration application.

As far as the domain name is concerned, it may be protected by registration as a domain name or registered as a trade mark. It is recommended that the domain name match the business name or other business identifier in order for the counterparties to easily find the company website.

The four strategies have different characteristics; however, they could overflow. The presentation of each strategy to the students reveals the multivariance of strategic decisions, outlines the advantages and disadvantages of each strategy, shows the positive results that the company can achieve from combining strategies.

## 3. Methodology for Examining Business Identifiers

Along with the theorical part of the course, the practical part of the student's work concerns examining business identifiers and preparing Individual assignments in accordance with the following principal methodology.

- Stage I: Identifying the problem of the study.

The preparation of the study begins with the formulation of the object, subject and purpose of the study. In practice-defining of the problem that will be the subject of the study. For example:

- Object: Business identifiers of the Bulgarian companies.
- Subject: Business identifiers protected as an industrial design (Locarno classes 14 and 32), as a trademark or as a geographical indication.
- Purpose: To study (1) what kind of business identifiers the Bulgarian companies use, (2) how they acquire IP protection of the business identifiers, and (3) whether Bulgarian companies manage their business identifiers after their protection.
  - Stage II: Use of sources for primary information – Students conduct a search in the following databases: www.bpo.bg, www.euipo.europa.eu, www.wipo.int
  - Stage III: Use of sources for secondary information – A survey of secondary information should also be conducted by the students, such as websites of the companies, company documentation, the Commercial Register of the Republic of Bulgaria, as well as other sources containing relevant information.
  - Stage IV: Processing and analysis of the primary data collected – Statistical processing and analysis are done by the appropriate computer program.
  - Stage V: Drawing the main findings of the study and formulating recommendations – At the last stage the main conclusions are drawn, the hypotheses are checked and the necessary measures and recommendations are identified.

Based on the studies conducted and after making a comparative analysis on the business identifiers, the student can make recommendations to the specific company concerning the use of one of the strategies revealed above.

## 4. Conclusion

The education model for IP protection of business identifiers is innovative and include both theoretical and practical studies. It is recommended for students in Master degree as it presents in-depth knowledge in the field of business identifiers and the strategies that companies could use for building a stable company business identification.

Choosing the most effective strategy is one of the fundamental decisions for any company. In a global, highly saturated and very well-developed digital market, strategic guidance and evaluation of the most effective strategy are needed. Adequate strategy and proper management of intellectual property help companies recover their investments. Moreover, investing in the protection of business identifiers as intellectual property on the basis of a well-written business identity management strategy creates a prerequisite for companies to make additional profit.

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# Emotional Intelligence Versus Intelligence Quotient in Higher Education as a Possible Predictor of Academic and Professional Successful Performance

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## Abstract

*Emotional intelligence refers to the ability to identify and manage one's own emotions, as well as reacting accordingly to the emotions of others. Though there is some disagreement among psychologists as to what constitutes true emotional intelligence, it is generally said to include at least three skills: emotional awareness, or the ability to identify and name one's own emotions; the ability to harness those emotions and apply them to tasks like thinking and problem solving; and the ability to manage emotions, which includes both regulating own emotions and those of the ones we are interacting with. More and more people accept that emotional intelligence is just as important to professional success as technical ability.*

*The concept of "Emotional Intelligence" has become a popular term to establish the potential ability of students or individuals in general to determine certain markers of success in academic and professional life. However, understanding the determinants of academic performance has never been easy. Most studies focus on the impact of one or the other, but very rarely has a comparative study on the impact of both of them combined been carried out. Traditionally, Higher Education has focused on IQ (Intelligence Quotient) overshadowing the development of IE (Emotional Intelligence), as a result university undergraduate, and professionals have underdeveloped adaptable skills (transversal skills) when working in teams. The limitations to the instruments to measure Emotional Intelligence and the still loose definition of the concept is seen by some as a deterrent to identify IE as a predictor of success. The article argues whether Cognitive Intelligence anticipates sufficiently an individual's success on its own, or the individual would need to develop adaptation skills to become a truly "Intelligent Individual", and therefore the need of higher education to introduce a curriculum for emotional intelligence.*

*Keywords: Emotional intelligence, intelligence quotient, higher education, internationalisation, academic performance, professional performance, curriculum development*

## 1. Introduction

It is not a secret that Emotional intelligence plays and important role in our relationships in our daily life. IQ is what determines the competences and individual capacities, on the other hand EQ determines how an individual manages own emotions and those of others to cope with pressures or face crisis. The difference between the two of them is that IQ cannot be alter, whereas EQ could be acquired and improved. [Segal, 2008]

Traditionally the type of skills that were promoted in higher education based on

intellectual capacities may no longer be sufficient to ensure academic and professional success. Although, the acquisition of theoretical and technical knowledge is essential in higher education, in recent years the approach on the idea to train social and emotional capacities has gain terrain. These trainings will allow students to also develop values and attitudes that guide them to transfer knowledge to challenges and scenarios of personal, social, academic, and professional progress. [Griffin and Reason, 2010]

Goleman, D. (1998) states that organisations that encourage people to be open and honest about their emotions perform better at establishing strong ties with colleagues (Collaboration), team accomplishments when given a certain level of resources (Productivity), the number of new and helpful ideas a team generates (Creativity), and the ability to avoid making mistakes or errors, particularly in high-pressure situations (Reliability). It seems that organisations that take into consideration employees' feelings and moods outperform those that ignore emotions and force employees to suppress negative ones. Professional organisations are incorporating increasingly emotional intelligence-based criteria to the recruitment process and training of employees. High EQ seems to lead to high employee engagement in the work environment and therefore an increment in productivity. EQ appears to be the single, best predictor of the success of prospective employees. [Okhifun, 2010]

## 2. Framework

The author of this article provided a set training session on Emotional intelligence to international students enrolled in the Civil Engineering Master Programme at Glasgow university last year. The programme had been offered in previous years and was purely based on cognitive and theoretical skills related to the matter topic, at the end of the programme students had an intensive week on site to demonstrate their engineering and leadership skills when leading a team compounded by mainly British students at a secondary school and vocational school level as well as engineering undergraduates.

Masters students demonstrated during the Intensive week on site that they performed well regarding their cognitive skills. However, students fail to perform properly when delivering their end product due to the low transversal skills and EQ levels.

The programme was implemented las year by adding interdisciplinary trainings such as presentation skills, leadership skills, and the concept of Emotional Intelligence in combination with Experiential Learning. Students were exposed to an unforeseen challenge which surprised them all, and demanded from students to put their transversal skills and emotional intelligence into practice. [Huisman *et al.*, 2019]

Students were introduced to the five key elements that according to Daniel Goleman (1998) compound Emotional Intelligence. Self-awareness; as the ability to manage your emotions and how your actions affect others. Self-regulation; individuals have the ability to regulate themselves and very seldom make rushed or emotional decisions. Motivation; self-motivated individuals work consistently towards their goals. Empathy; the ability to understand someone else's situation. Social skills; high communication skills, manage change, and resolve conflicts successfully.

Students were monitored on Emotional Intelligence during the Intensive Period of a week at the end of their Masters programme and asked to reflect on their own performance regarding their accomplishments and performance of cognitive and EQ skills in a report.

## 3. Student Experience

Students were monitored on Emotional Intelligence during the Intensive Period of a week at the end of their Masters programme and asked to reflect in a report on their own performance regarding their accomplishments and performance of cognitive and EQ skills.

Students were asked to reflect on a daily basis, not only on their organisational and cognitive skills but also on their leadership skills taking into account EQ five key skills.

At the end of the Programme students noticed that they had improved their self-awareness and had a clearer understanding of their strengths and weaknesses. Among weaknesses many students mentioned acceptance of own mistakes and consequences.

According to the majority of students at the very beginning of the Intensive Period, they had difficulties in avoiding making mistakes or errors particularly in high pressure situations, and therefore they felt frustrated, such mindset had a negative influence on their leadership skills towards the team they were leading. Furthermore, students felt they lacked the ability to understand other's emotions, as a consequence they could not respond to the team member's emotions properly, which resulted in a lower level of productivity and performance in the team.

Social skills and Empathy seem to be the two key skills students had the most difficulties with; pay attention to body language, facial expressions, and conflict resolution. In many cases, students felt that failing to enhance in an adequate early relationship with their team, resulted in a poor interactive communication process of mutual recognition and understanding. Even though, all Master students had a proficient level of English, it appears that the use of the language towards the native speakers in the team was also a deterrent to lead the team effectively. To be able to communicate in a foreign language does not mean automatically to be able to communicate effectively and understand the nuances of the language.

In all cases, the reflective report helped them to improve their skills and motivation levels. Being the ones the most improved self-awareness and self-regulation.

## 4. Conclusion

Emotional Intelligence could be taught in higher education, provided that the university environment facilitates within the curriculum the training on such skills, which could strengthen multiple learning experiences. Emotional Intelligence will enable students to face challenges and solve conflicts in a sustainable manner.

To have effective leadership skills, individuals must have a solid understanding of how their emotions and actions affect the people around them. Many employers identify Emotionally Intelligent individuals as higher performers than the employees with a lower EQ who are less engaged. Therefore, teaching emotional competences in higher education will greatly contribute to the employability of students.

Even though the exposure to trainings on Emotional Intelligence could be brief, individuals acquire basic tools of EQ to enhance their relationships on the workplace and academic environment. EQ tools such as making powerful connections, understand better non-verbal communication, defuse arguments and conflicts among others. [Segal, 2008]

As well as reflecting in a report on their Emotional Intelligence skills. It is advisable to have students reflect on a regular basis in the form of a reflective journal. The journal will enable them to improve their self-awareness among other skills.

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# Generative Model for Cyber Ethical Issues in Education

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## Abstract

*Introduction: The development of social networks has demonstrated very clearly the synergetic effect of combining information and communication technologies illustrating their enormous impact on the modern society, which we now call information. The characteristic features of this information society are many and those that most significantly distinguish its virtual nature include abstractions such as independence of distance and location. At the same time, along with the positive nature of the information society in its rapid development, the bad aspects and expressions emerge of an increasingly complete emanation of real life in the virtual, cybernetic dimension. Instances emerge of social polarization and exclusion, new virtual cultures with low and even negative contributions. In this regard, questions arise concerning the ethical behaviour of participants in the cyber dimension of current and future social development. We will not attempt to define the term cyber ethics here because it is essentially no different from the philosophical concept of ethics. The only difference is only in its scope of cyber space with all its natural peculiarities.* **The paper aims:** *In the presented research, we draw upon the view that cyber ethics should give us an orientation as to what is right or wrong, good or bad, based on different subjective feelings, understandings, values, virtues and legal norms. It is clear that in the current social practice, ethical expressions have a marked cyber aspect. In essence, this is a prerequisite for paying particular attention to ethical issues in university education.* **Goal and Objectives:** *The aim of this research is to create and propose a conceptual generative model for training in Ethics in a cyber university environment. The application of various information and knowledge technologies such as artificial intelligence (in medicine), social media in public relations, methods of accessing databases related to elections, recognition technologies in security, multimedia technologies in the digitalization of cultural values, definitively share the specific objectives of this project.* **Methodology:** *The research methodology chosen best corresponds to the type of scientific work. The so-called Architectural Approach forms the main contemporary toolbox of modern change. This methodology is natural in such cases and can respond to the intended and carried out scientific and applied research.* **Conclusion:** *Cyber ethics, as an emanation of ethics in the virtual cyber space, should also be considered in relation to current social practices. All technological, political, economic, etc. processes that involve a cyber-related component should be evaluated in their ethical aspect with respect to their total positive or negative impact on society.*

*Keywords: cyber ethics, education, generative model, innovation, knowledge, technology, information, research*

## 1. Introduction

The development of the Internet has clearly shown the synergy effect of the mix of contemporary information and communication technologies apart from illustrating their huge impact on modern society, which we call today 'information society'. The characteristic features of this information society are numerous but the most outstanding ones include abstractions such as the independence of distance and location. In the virtual world, the size ceases to be such a significant factor, there is an improvement in communications globally, which to the ordinary user takes the form of an information torrent. At the same time, alongside the positive character of information society, during its turbulent development, there appear negative aspects and manifestations of the ever so saturated emanation of real life into the virtual dimension. There are instances of social polarization and exclusion, new virtual cultures emerge with low and even negative level of contribution. In the context of the latter conclusion, the COVID-19 pandemic clearly demonstrates the social distancing in different societies all over the world.

Cyberspace is the global space of virtual reality, a parallel world to the physical world.

The significance of this cyberspace has grown exponentially over the last three decades. It is present everywhere and at all times, penetrating the physical space with a huge impact on culture, religion and especially in education.

Cyber ethics differs from ethics by definition only in that it refers to cyber space with all its peculiarities. Both ethics and cyber ethics should give us orientation as to what is right or wrong, good or bad on the basis of different world views and systems of values, sums of virtues and norms. Cyber ethics can be viewed in the same ethical domains of manifestation that include personal life, social relations, the environment, political, economic and cultural interactions. Applying different information technologies such as artificial intelligence in medicine, social media in social relations, methods for access to databases when organizing and conducting elections, recognition technologies in security, multimedia technologies in the digitization of cultural values have demonstrated this co-relationship. In practice, all real ethic manifestations include a cyber-aspect.

Reversely, this means that all technological, political, economic and mostly educational processes that include a cyber-component must be viewed and evaluated in their ethical aspect with regard to their positive or negative impact on society as a whole and on each individual.

## 2. Ethical Norms and Principles in Information Society

Globethics.net published in 2013 a discussion paper entitled ETHICS IN THE INFORMATION SOCIETY: The Nine 'P's. These values were given in nine major topics of the information society, the Nine 'P's: principles, participation, people, profession, privacy, piracy, protection, power and policy, the ethical problems in education being in almost each and every one of them, namely:

1. Principles of ethical values: Knowledge societies can be sustainable, coherent, innovative and integrative if they are based not only on pragmatic opportunities or political or financial interests, but on ethical values.
2. Participation: Access to knowledge for all: Access to information, communication, education and knowledge is a basic right and public good.
3. People: Community, Identity, Gender, Generation, Education: People, human beings, as senders and receivers are the key actors of information, communication and knowledge. How to filter, digest and assimilate information and knowledge? How to use them for enrichment and not confusion, for identity building and not identity-loss, for respect of diversity and not increase of

uniformity, for more equality instead of more inequality?

4.  Profession: Ethics of information professions: Professions in the fields of information, communication and knowledge creation, processing, dissemination, control, renewal, preservation, archiving and policy-making have a special ethical responsibility in implementing core values.
5.  Privacy: Dignity, Data mining, Security: Privacy is a human right, not a commercial concession.
6.  Piracy: Intellectual property, cybercrime: Piracy is an old problem, with a new electronic face.
7.  Protection: Children and young people: Through access to the Internet on computers, smartphones and tablets, young people are connecting with each other and wider society in ways that were previously unimaginable. A generation of children and young people have grown up for whom the digital world is taken for granted. Nevertheless, there are concerns that children, young people and young adults may face specific risks and hazards, including sexual exploitation, a lack of anonymity and potential addiction to online networks.
8.  Power: Economic power of technology, media and consumers: The production, processing, dissemination, control and archiving of information, communication and knowledge need political power to set the legal frame and economic power to provide the necessary investment capital.
9.  Policy: Ethics of regulation and freedom: Parliaments, governments, civil society and educated citizens are needed to ensure that regulatory measures support freedom of expression, freedom of association in information and communication technologies and the right to seek, receive and impart information and ideas through any media and regardless of frontiers

## 3. Cyber ethical Problems in Education

In order to have a positive cyber impact on society, education must constantly adhere to the following three basic ethical recommendations:

1.  Setting the ethical framework of behavioural values and virtues in cyber-space: freedom, non-violent communication, fairness, equality, sustainability, care and virtues like respect, integrity, transparency, honesty, etc.
2.  Widening media education from technical skills to compulsory media education for values and virtues at all levels, including higher education and lifelong learning.
3.  Strengthening the responsibility of individual users of cyber devices, from mobile communication to social media, the Internet in general, including interaction with robots and communication through artificial intelligence.

It is worth noting that knowledge and education on cyber ethics have a direct impact on human behaviour. Ethics education has a positive impact on students, i.e., knowledge of ethics can lead to a reduction in the abuse rate, and the computer science curriculum can be improved by including a module on computer ethics and social responsibility.

We live in an interesting world today with newly-emerging technologies that promise to totally impact the way human activity and enterprise will develop in the course of time.

They include new technologies such as Artificial Intelligence, The Internet of Things and Blockchain. These new technologies (Artificial Intelligence, The Internet of Things and Blockchain) pose new challenges regarding the intersection between Cyber law and cyber ethics, which must be addressed in an appropriate way through adequate legislative and legal frameworks and actions in times that follow. No wonder the World Economic Forum's list of the 10 Latest Technologies for 2015 includes those that aim to

resolve some ethical debates generated by an earlier generation of technologies, as well as others that will lead to new ethical and regulatory challenges.

## 4. Structural and Functional Frames of the Generative Model

The emergence of artificial intelligence poses new ethical questions and doubts which should be noted and considered in laws and other legislative norms that regulate cyber space. Should artificial intelligence be allowed to develop beyond the point of outdoing the human brain? Besides, should artificial intelligence be allowed to ethically not give in to human will and instead to take independent course of action that could possibly lead to catastrophic consequences to human society?

The increasing proliferation of robotic systems poses many ethical challenges, from the ethics of research and development of human-robot interactions to the programming of ethics for autonomous systems and the social impact of robotic technology in areas such as self-driving vehicles, the widespread displacement of human labour through automated and autonomous systems. Ethics is an ongoing and dynamic enterprise.

When for instance new technologies emerge, there is a laudable concern firstly to 'create' their whole ethical system so as to 'cover them'.

Structurally, the proposed model does not differ much from the traditional educational models. In most countries around the world, the majority of school children and university students continue to graduate from educational institutions without learning anything about the connection between digital and critical thinking. However, in addition to tradition, we emphasize our efforts in the field of modern knowledge in information and communication technologies, which are an essential addition to the ability of learners to assess and make decisions and classify information in order to be able to identify themselves as individuals in the real as well as in the digital world.

In the context of the functional framework of the model, we believe that concerning the debate on digitalization in the education sector it should be immediately pointed out that the acquisition and introduction of advanced technologies only in educational institutions will not offer a solution to the more worrying educational problems that prevent the successful participation of these advanced technologies in the digital world.

Therefore, in this framework, it's all down to the interaction between education and its natural requirements such as freedom, language ability and personal independence, not technologies themselves.

Freedom of education is both a necessity and a consequence, and the same is true of language skills and personal development. This cannot be expected of technological systems, but requires individual responsibility and cooperation. Therefore, it doesn't matter whether one receives knowledge and understanding from digital or analogue (printed) sources. What is required is competent classification and assessment skills.

This can happen especially on the basis of one's own knowledge and the resulting local and/or global discourse for their better regeneration.

A major aspect of the model is the need for students to have sufficient freedom to practice critical thinking. To this end, however, existing structures need to be modified in such a way that this critical thinking skill can be applied repeatedly in the learning process and thus improved. In this regard, the question arises about the content of education and the canon of knowledge, both in the real and in the virtual world.

## 5. Conclusion

In conclusion we must point out that digital transformation is not only limited to the technological sphere. It impacts to a great extent the whole virtual and physical essence

of the global space around us. Thus, ethical questions and spheres of conflict arise, which have to be solved in the most appropriate manner. Ideally, the first aim is always a critical reflection on 'good life' even in the virtual world. The 'good' in it, however, should always be reviewed, defined and negotiated. Even in the information saturated mix of opinions, this enables the reflected independence of thought and a focus on the understanding, localization, differentiation and eventually the evaluation of changes on the 'new definitions' of 'good' that might be necessary in the process of transformation.

All in all, our Conceptual Generative Model for Cyber Ethical Issues in Education seeks and finds the interaction between critical thinking and Cyber ethics. On the one hand, critical thinking requires values derived from ethical principles so that it is not arbitrary, but at the same time ethical principles require critical (over) thinking of real or expected changes. In this respect, even in digital times, people remain bound to participate in solving immediate social problems responsible and behaving ethically: to be curious, to be able to argue and, above all, to think critically about themselves and society.

### *6. Acknowledgements*

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# Impact of Entrepreneurs' Management Qualification on the Competitive Performance of their Businesses

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## Abstract

*The success and competitive performance of today's companies depends on many factors. When it comes to enterprises personally managed by their founders, the entrepreneurs' educational background and qualifications, incl. management one, are among these factors.*

*The paper examines the impact of entrepreneurs' management qualification, acquired through business-related education or training, on some performance indicators of their companies.*

*The paper contains a literature review on the role of entrepreneurship and management education and training in obtaining management qualification and further – its relationship with the entrepreneurial companies' competitive performance. Some data about Bulgarian economy, entrepreneurs and enterprises are given. The conclusions drawn are based on a research of 500 Bulgarian SMEs that evidences the positive relation between the presence of specialised university education or training of entrepreneurs and the success of the companies they manage. Their companies have enhanced competitive performance compared to the other entities in the sample due to better dealing with customers and achieving greater financial efficiency.*

*Keywords: education and training, management qualification, entrepreneurs, enterprises, competitiveness*

## 1. Introduction

Many studies show that the level and the quality of the entrepreneurs' educational background and qualifications have impact on their abilities to manage their businesses successfully. The higher educational level is connected with acquiring knowledge and skills that are important for organising and performing entrepreneurial activities, such as detecting and utilising opportunities; taking calculated risks [10]; providing external funding; business development planning; establishing fruitful relations with business partners, subordinates, equals and superiors [3]; conceptual thinking; proper decision-making [1], etc.

However, the relationship between the presence of management qualification of the entrepreneurs and the competitive performance of their companies has not been deeply examined, especially in the developing or ex-socialist countries. At the same time, the literature attributes the failure of a significant part of the newly started enterprises (during the first three years of their existence) namely to the scarce managerial competencies of their executives [6]. This is so, because along with the overall education that provides important knowledge and skills, the management qualification of the entrepreneurs who are personally leading their companies is supposed to be a main prerequisite for the survival and competitive performance of their businesses.

The aim of the paper is to examine the impact of entrepreneurs' management qualification, acquired through education or training, on some performance indicators of the companies they manage.

## 2. The Relation "Education – Management Qualification – Competitive Performance"

High management qualification could be hardly obtained without university education in entrepreneurship or management, or long-time involvement in business courses.

Entrepreneurship education develops both the entrepreneurial and managerial qualities of the students.

A study made by a team of the World Bank on the entrepreneurship education and training programs around the world [11] categorizes the programs' outcomes into a series of four domains. One of them is the entrepreneurial performance that refers to how some indicators of a venture's performance change when entrepreneurs have passed such education and training (e.g., higher profits, increased sales, greater employment of others, higher survival rates). The narrower in scope training in management also develops competencies that are important for nowadays entrepreneurs, helping them to be good managers of the businesses they have created.

In addition to the above indicators for venture's performance, the following can be also mentioned here: growth and productivity [2], competitiveness through managing the company's intellectual property portfolio [5], important personal and social outcomes of the business [7].

Of course, some entrepreneurs possess innate managerial flair and they are successful without such education and training but this is not the general case. Other entrepreneurs learn by their own professional and business experience. As Simpson, Tuck and Bellamy [9] found out, most enterprises that they have investigated actually rely heavily on prior knowledge and experience, not on education and training. Such entrepreneurs gain entrepreneurial and managerial expertise through trial and error, but usually this happens slow and is expensive. Thus, specialised education and training remains the main tool for accumulation of management qualification by entrepreneurs or at least they foster the development of some management competencies.

As Rambe and Makhalemele [8] pointed out, there is a growing body of literature that examines the positive relationship between management competencies and company performance. In spite of this, most of the competencies have been studied in isolation and with little effort to recognise their mutual relationships with specific aspects of performance such as profit, growth and efficiency. Moreover, many of the studies tend to emerge from advanced economies and little is known about this relationship in emerging economies.

The competitive performance of an enterprise usually relates to the efficiency and effectiveness with which it carries out its tasks in the process of providing products and services to customers and it should be as good as or better than its competitors when doing this. The competitive performance is a phenomenon with multiple aspects that are difficult to quantify. That is why there is no consensus on appropriate measures of the competitive performance but among the most used indicators are the customers' satisfaction and some financial outcomes compared to the competitors' ones.

## 3. Empirical Evidence from Bulgaria

Bulgaria has relatively young developing market economy where the private business sector has history of only three decades. The changes after 1989 gave freedom and

many opportunities to the Bulgarian entrepreneurs – opening new markets, accessing new technologies, joining international networks, absorbing managerial knowledge from foreign partners, etc. Since 2007 Bulgaria has been an EU Member State and its entrepreneurs have the chance to benefit from the single European market and from the financial instruments of the European funds [4].

Currently Bulgarian economy is of open type and many Bulgarian enterprises (mostly the larger ones) already have internationalised their activities. The dominating as a number and importance business units in the country are small and medium-sized enterprises. They are the major creators of employment, added value, innovations and their activities contribute significantly to the formation of a new (entrepreneurially oriented) business culture [10].

Educational level of Bulgarian entrepreneurs is relatively high. In the last two decades between 50 and 60% of them possess higher educational degree.

For Bulgaria, there is no official information and targeted research on the management competencies possessed by the entrepreneurs and their impact on the success of the enterprises they manage [6]. A fundamental scientific research project contributes to filling this gap. The project titled "Determinants and models of the competitive performance of the small and medium-sized enterprises in international business environment" was funded by the National Science Fund of the Bulgarian Ministry of Education and Science and implemented by a research team with the participation of the author of the current paper. The empirical survey within the project was conducted in 2018 and covered a representative sample of 500 Bulgarian SMEs having international activities.

Predominant part of the surveyed entrepreneurs were also managers, i.e., have not recruited professional managers and delegated management activities yet. In this case, the success of the companies should depend largely on themselves.

32% of the surveyed entrepreneurs declared that they had acquired management qualification in the course of their higher education, which included management subjects or other specialised business subjects. This not so high percentage can be largely explained by the mentioned young market economy of Bulgaria, giving due attention to education in economics only in the last 20 years. Therefore, it is not surprising that 9% of the surveyed entrepreneurs had decided to improve their management skills by attending management courses, and 5% planned to attend such courses in the future.

The impact of entrepreneurs' management qualification (obtained only through education/training and not otherwise) and the main performance indicators of their companies was examined with two questions.

First, the respondents have been asked to evaluate the company's performance over the past three years compared to their major competitors in terms of customer satisfaction and ability to retain the most valuable customers. Although no quantitative measures have been used for this, and only the subjective assessment of the respondents has been relied upon, the companies whose entrepreneurs possessed formal management qualification had higher scores on the above two indicators.

Second, the respondents have been asked to make assessments concerning some of the company's financial outcomes over the past three years, compared to their main competitors, namely: business profitability, efficiency, return on investment, achievement of financial goals, actual profit against the planned one. The average scores on these indicators for all companies included in the sample were good, as all outcomes had higher values for companies whose entrepreneurs possessed management qualification acquired through education/training. The largest difference has been observed in the indicators of business profitability and return on investment.

## 4. Conclusion

Possessing high level of education is important for entrepreneurs because it develops qualities and skills necessary not only for establishing but also for managing own business. For entrepreneurs who are managing their businesses by themselves (without the help of professional managers) the management qualification is substantial as well, no matter how it has been gained. However, the education and training remain the most reliable method for this. The impact of entrepreneurs' management qualification on the competitive performance of their businesses is still little researched but the study of Bulgarian entrepreneurs shows that those of them who have a specialised university education with included management or business subjects or have attended management courses do better as managers. Their SMEs report better competitive performance due to successful customer relationship management and higher financial outcomes of the business.

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# Impressions on Accreditation as a Tool for Quality Assurance of the Internationalization in Higher Education: Gains and Challenges

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## Abstract

*Regarding the international dimension of higher education, quality assurance is a key component for higher education systems around the world, and the purpose and functions of quality assurance must be investigated locally as well as globally. Accreditation, as a tool for quality assurance of the internationalization in higher education, is a mark of distinction for academic programs. Universities with all their stakeholders inside and outside the institutions directly benefit from the involvement in a comprehensive assessment of how effectively the program or institution meets its stated mission. This study aims to investigate the impressions of academics on the accreditation process of the programs in the context of internationalization utilizing a qualitative research design. The study group consists of 20 instructors working at a state university in Turkey. The data gathered from the remarks of the instructors were analysed through qualitative content analysis method. The results of the study revealed six themes: Perceived accreditation, perceived functions of accreditation, change contingent on accreditation, perceived organizational performance, perceived organizational improvement, and quality assurance. With respect to the codes found out under the themes, perceived accreditation were made up of compliance in standards, international recognition, determination of qualifying criteria, mechanism for quality assurance, improvement in the conditions, and overcoming the deficiencies; perceived functions of accreditation involved standardization, internationalization, improvement, increase in performance, a tool for quality assurance, sustainability, modernization, external inspection, and reliability; change contingent on accreditation comprised of regular reporting, accountability, international validity, improvement in technology, systematization, and effective use of resources; perceived organizational performance consisted of professional development, organizational division of labor, administrative arrangements, and unchanged performance; perceived organizational improvement involved improvement in technology, physical conditions, and programs; quality assurance involved accreditation, standards for organizational needs, and in-service training.*

*Keywords: Accreditation, quality assurance, internationalization, higher education*

## 1. Introduction

Internationalization in higher education has been the center of expanding consideration. Therefore, studies on the internationalization of higher education institutions clearly address issues of higher education beyond national boundaries [1], which provides opportunities for universities to benefit from increasingly diverse

individual experiences [2]. This diversity triggers the change universities have had to face, and the role of quality assurance comes to the forefront with regards to responding to the challenge resulting from the change the paradigm of internationalization has created. Accordingly, the requirements for international recognition, standardization, and accountability have dramatically become considerable factors for universities to improve.

Quality assurance is a key component for higher education systems around the world, and the purpose and functions of quality assurance must be investigated locally as well as globally [3]. Shin described quality assurance as "the system to enhance the quality of education" [4]. Even though some researchers use the term quality assurance interchangeably with the concept of "accreditation" [5], quality assurance is an umbrella concept representing accreditation.

Accreditation, as a tool for quality assurance of the internationalization in higher education, is a mark of distinction for academic programs [6]. Universities with all their stakeholders inside and outside the institutions directly benefit from the involvement in a comprehensive assessment of how effectively the program or institution meets its stated mission. A variety of accreditation types such as institutional and programmatic accreditation [7], are offered by some external agencies "conducting the process to encourage and promote school improvement, thus fostering excellence in the education" [8]. Therefore, higher education institutions tend to enter into the process of accreditation resulting in self-study applications in order to meet their international needs and assure quality in their organizations, which results in a variety of gains as well as challenges.

This study aims to investigate the impressions of academics on the accreditation process of the programs in the context of internationalization utilizing a qualitative research design.

## 2. Methodology

### 2.1 Research Design

The research design of this study was specified as qualitative data collection gathered in order to find out the impressions of academics on the accreditation process of their institution. The study group specified through purposeful conventional sampling comprised of 20 instructors working full time at a state university in Turkey.

### 2.2 Study Group

In this qualitatively designed study, 20 lecturers were interviewed. The demographic characteristics of the academics are as follows: 5 (25%) of these lecturers are male and 15 (75%) are female. In terms of seniority, 1 participant (5%) with 1-5 years, 6 participants (30%) with 6-10 years, 4 participants (20%) with 11-15 years, 4 participants (20%) with 16-20 years, 2 participants (10%) with 21-25 years and 3 participants (15%) with 26-30 years of experience in the field took place in the study.

### 2.3 Data Collection Instrument

In this study, a semi-structured interview form including 7 open-ended questions was used to collect data from academics about the accreditation process of the institution.

After necessary validity and reliability procedures were followed, the data collection instrument was prepared by the researcher to determine the extent how the study group perceived accreditation process with its benefits and challenges in terms of quality assurance.

## 2.4 Data Collection

Utilizing the semi-structured interview form put into its final form after examining the existing literature on accreditation, the interviews were made with 20 instructors at the proper place and time specified before.

## 2.5 Data Analysis

In order to analyse the data obtained from the instructors; content analysis was used in the light of scientific knowledge in the field. Each participant was given a representative code (T1, T2, ..., T20). The number of participants and the times they stated the codes were analysed accordingly. During the content analysis, themes and codes revealed were used in a scientifically interpretive way depending on the literature on accreditation.

## 3. Findings

Based on the findings obtained from content analysis, 6 themes were revealed: Perceived accreditation, perceived functions of accreditation, change contingent on accreditation, perceived organizational performance, perceived organizational improvement, and quality assurance. Under the theme of perceived accreditation, 6 codes were found out as compliance in standards (8/20), international recognition (6/20), determination of qualifying criteria (6/20), mechanism for quality assurance (4/20), improvement in the conditions (3/20), and overcoming the deficiencies (3/20) (See Table 1).

Table 1. The Codes for Perceived Accreditation

| Theme | Codes | N | f |
|---|---|---|---|
| Perceived accreditation | Compliance in standards | 8 | 35 |
| | International Recognition | 6 | 19 |
| | Determination of qualifying criteria | 6 | 16 |
| | Mechanism for quality assurance | 4 | 38 |
| | Improvement in the conditions | 3 | 19 |
| | Overcoming the deficiencies | 3 | 13 |

Under the theme of perceived functions of accreditation, 9 codes were identified as standardization (8/20), internationalization (7/20), improvement (7/20), increase in performance (6/20), a tool for quality assurance (5/20), sustainability (4/20), modernization (3/20), external inspection (3/20), and reliability (3/20) (See Table 2).

Table 2. The Codes for Perceived Functions of Accreditation

| Theme | Codes | N | f |
|---|---|---|---|
| Perceived functions of accreditation | Standardization | 8 | 40 |
| | Internationalization | 7 | 13 |
| | Improvement | 7 | 8 |
| | Increase in performance | 6 | 13 |
| | A tool for quality assurance | 5 | 37 |
| | Sustainability | 4 | 6 |
| | Modernization | 3 | 7 |
| | External inspection | 3 | 14 |
| | Reliability | 3 | 12 |

Under the theme of change contingent on accreditation, 5 codes were detected as regular reporting (11/20), accountability (8/20), international validity (7/20), improvement in technology (6/20), systematization (5/20), and effective use of resources (4/20) (See Table 3).

*Table 3. The Codes for Change Contingent on Accreditation*

| Theme | Codes | N | f |
|---|---|---|---|
| | Regular reporting | 11 | 19 |
| | Accountability | 8 | 11 |
| Change contingent on | International validity | 7 | 7 |
| accreditation | Improvement in technology | 6 | 13 |
| | Systematization | 5 | 10 |
| | Effective use of resources | 4 | 5 |

Under the theme of perceived organizational performance, 4 codes were revealed as professional development (8/20), organizational division of labor (7/20), administrative arrangements (6/20), and unchanged performance (5/20) (See Table 4).

*Table 4. The Codes for Perceived Organizational Performance*

| Theme | Codes | N | f |
|---|---|---|---|
| | Professional development | 8 | 9 |
| Perceived organizational | Organizational division of labor | 7 | 14 |
| performance | Administrative arrangements | 6 | 13 |
| | Unchanged performance | 5 | 24 |

Under the theme of perceived organizational improvement, 3 codes were found out as improvement in technology (10/20), improvement in physical conditions (7/20), and improvement in programs (6/20) (See Table 5).

*Table 5. The Codes for Perceived Organizational Improvement*

| Theme | Codes | N | f |
|---|---|---|---|
| | Improvement in technology | 10 | 13 |
| Perceived organizational | Improvement in physical conditions | 7 | 11 |
| improvement | Improvement in programs | 6 | 8 |

Under the theme of quality assurance, 3 codes were detected as accreditation (10/20), standards for organizational needs (10/20), and in-service training (8/20) (See Table 6).

*Table 6. The Codes for Quality Assurance*

| Theme | Codes | N | f |
|---|---|---|---|
| | Accreditation | 10 | 110 |
| Quality assurance | Standards for organizational needs | 10 | 10 |
| | In-service training | 8 | 9 |

## 4. Discussion

Accreditation is an internationally recognizable standard-based process [9], which supports the findings of this research because the perception of accreditation involves compliance in standards, international recognition, determination of qualifying criteria,

mechanism for quality assurance, improvement in the conditions, and overcoming the deficiencies. Accreditation aims to define criteria and improve the quality of the institution according to these criteria. Accreditation is a quality control mechanism through assessment [10]. Accreditation is an opportunity to address the institution's shortcomings [11]. The perceived functions of accreditation were revealed in this study as standardization, internationalization, improvement, increase in performance, a tool for quality assurance, sustainability, modernization, external inspection, and reliability. This implication supports Eaton's [9] description of the functions regarded as "trust-based, standard-based, evidence-based, judgment-based and peer-based" in nature.

As another finding in the study, change contingent on accreditation is inevitable for higher education institutions. The types of the change were revealed as regular reporting, accountability, international validity, improvement in technology, systematization, and effective use of resources. Accreditation in education is a process that regulates the control of colleagues in order to increase institutional quality ensuring academic development in educational institutions and fulfilling social accountability, and evaluating a team of colleagues/peers [12]. Stensaker and Harvey characterized quality assurance as the main global accountability tool in higher education [13], which requires regular reporting, systemization, and effective use of organizational resources.

As for organizational performance, the accreditation process brings about a number of benefits and challenges universities have to face. Professional development practices and organizational division of labor are inevitable stages to be accredited because organizations need to meet the standards asked for accreditation. Based on these stages, it can be implied that administrative arrangements due to accreditation will positively affect organizational performance. However, it was also determined that the accreditation process did not affect the organizational performance, the arrangements made mostly on paper and did not reflect directly on student achievement in classroom work. Although accreditation is a tool to increase institutional quality, there may be situations where the work done through accreditation cannot be internalized by the institution, which results in unchanged performance within the organization. Especially unchanged performance as the finding of this study is in parallel with the literature.

According to Sarrico *et al.*, [14], "the accreditation process itself as assessment does not necessarily lead to improvement". Quality assurance in higher education is an indispensable phenomenon in the internationalization paradigm. However, although the value of high-quality education systems is accepted by all knowledge-based societies, achieving this ideal becomes difficult due to unbridgeable gaps between political discourses and the reality of educational environments [15]. When the quality assurance models and trends that will contribute to transnational regulations in higher education are analysed, the model dealing with the development of true international quality assurance and accreditation agreements is among the prominent quality assurance models recently [16]. Nevertheless, some lecturers in the study are of the opinion that the standards set by foreign and another institution cannot be sufficient in evaluating and improving the institution's unique conditions. Therefore, what is important for quality assurance is setting standards according to institutional needs. In conclusion, higher education institutions take gains and challenges into consideration during the accreditation process.

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# Inventions in IP Education

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## Abstract

*The subject matter of this paper are the inventions in intellectual property education. The patent protection of inventions in the field of intellectual property, including digital learning inventions will be identified. The paper analyses ways of protecting inventions in intellectual property education, providing examples from European and international practice. By obtaining patent protection, patent holders can be monopolists in a particular market and territory, thereby facilitating the generation of profits for them. The role of the technological progress of society, the introduction of new digital teaching methods and the way in which it affects digital competitiveness are highlighted. Examples of inventions that are protected by companies in the area of intellectual property education have been identified. The role and importance of innovation and new technologies in education and the ways in which protecting innovative products as inventions helps society globally. The dynamics of technological development contribute to the imposition and development of technological products in the intellectual property education.*

*Keywords: Invention, intellectual property education, digital learning, patent protection, digital competitiveness, innovation*

## 1. Introduction

This paper will address the topic of inventions in intellectual property (IP) education, including the identification of inventions in digital learning. The inventions are helping enterprises in international aspect to generate large profits by imposing a competitive innovative product on the market. It is through patent protection that many companies are able to gain monopoly advantages globally and to be at the forefront of other competitors in their development environment. Today's world of globalization and high-tech development has contributed to patenting inventions in various innovative fields. Of even greater importance is digitalization, which helps to deliver training globally by introducing online platforms and systems through which to deliver learning in an online environment. The patented inventions in IP education, the introduction of new digital learning methods and the way in which they affect digital competitiveness must inevitably be noted. IP is a factor of company competitiveness. [1]

The essence of the invention as an IP is identified and the ways of obtaining a patent abroad are examined. Examples of companies and inventions that are protected in IP education and digital learning are given, as well as the results of the patent applications and granted patents in this field are examined.

**The subject** matter of this paper are the inventions in intellectual property education and digital learning.

## 2. Protection of Inventions in IP education

### 2.1 Invention

The inventions help the people to solve various problems in the science and technology. The introduction of innovative products and methods in each industry has contributed to the patenting of objects with high economic performance. In turn, inventions in digital learning help their patent holders gain digital competitiveness over other companies in the market. In order to be defined as an invention, the intellectual product obtained must necessarily be a technical solution to a problem, and the task can be in any field of public economy. [2] In order to be granted a patent for an invention, it must cumulatively meet the three criteria of patentability – novelty, inventive step, and industrial applicability. The patent protection of the invention is granted by patent. Once issued, its holder gains exclusive rights to the patentable invention, which include the right to use the invention, the right to dispose and prohibiting other persons from using the invention without the consent of the patentee.

In this way, on the one hand, the interest of the business is protected for access to new technological products, for the development of innovative production and on the other hand, the interest of the patent holder is protected – it holds monopoly rights for a fixed term and for a specific territory. The term of protection of the invention is 20 years from the date of filing of the patent application. A patent has a territorial effect – it operates within the territory of the country to which it was issued.

The discipline of "Patent policy" and in particular inventions are studied at the University of National and World Economy (UNWE), Sofia, Bulgaria by undergraduate students, specialty "IP and Business".

### 2.2 Patenting Abroad

A prerequisite for patenting abroad is the desire of every company to obtain patent protection, except in his or her national territory and in the territories of the countries in which he or she intends to economically realize his/ her invention.

#### 2.2.1 National Patent Procedure Abroad

The essence of the national patent procedure abroad lies essentially in the fact that in each country in which we would like to obtain a patent, a separate "national" application should be filed. Patents in individual countries are granted in accordance with their national patent laws. Patents operate independently of one another and the termination of a patent granted in one country is irrelevant to the operation of patents in other countries.

#### 2.2.2 European Patent under the European Patent Convention

It has been established on the basis of the (EPC), signed in Munich on 05.10.1973.

A European Patent Organization (EPO) has been established on the basis of the Convention and a European Patent Office (EPO) has been established with headquarters in Munich. The advantage of the European patent lies in the fact that the applicant can obtain protection of his invention in the territory of one or more EPO Member States by filing a single patent application, which is subject to examination and examination by one body – the European Patent Office, subject to rules.

#### 2.2.3 The Patent Cooperation Treaty (PCT)

PCT has been signed on June 19, 1970 at a Diplomatic Conference held in Washington. It is administered by the World Intellectual Property Organization (WIPO).

By filing one international patent application under the PCT, applicants can

simultaneously seek protection for an invention in a large number of countries. One of the main advantages is the submission of one application, in one language, one publication, examination etc.

Obtaining patent protection has a strong impact on the economic development of patent holders. In the absence of patent protection, they would find it very difficult and almost impossible to succeed in conquering a market and economically realizing their invention. Patent procedures in accordance with PCT and EPC facilitate the acquisition of industrial property rights in a large number of countries.

## 3. Examples of Patented Inventions in IP Education and Digital Learning

### 3.1 System for Supporting Education in Retrieval of Intellectual Property Right

Patent № JP 4775789 B2. The patent is granted for Japan by Univ Tokai. It refers to a system for supporting education for retrieval of intellectual property right wherein a student voluntarily learns when a teacher gives the student an assignment in retrieval of a patent, and the teacher remotely monitors the student's progress in learning.

### 3.2 Learning Apparatus in Digital Environment

Patent № US 10445660 B2. The patent is granted for the territory of USA and the patent owners are Ma Zhengfang and Tan Hong. A learning apparatus in a digital environment is advantageous to interaction and communication among users who use a knowledge point structure for learning. [3]

## 4. Enterprises, Patented Inventions in IP Education and Digital Learning

Given the large number of foreign companies that have patented inventions in IP education and digital learning at the international level, a comprehensive list of all companies that have protected inventions in this field could not be provided. The applicants, respectively the patent holders are big companies like IBM, Microsoft and individuals who would like to patent innovative technologies in order to maintain good competitive positions. The students of UNWE often choose to explore the patent policies of big companies when preparing their individual assignments in the specialty of "IP and Business". The companies listed below are selected mainly because of the number of applications they have filed for inventions and patents issued in IP education and digital learning.

### 4.1 International Business Machines Corporation (IBM)

Is an American multinational technology company headquartered in New York? IBM is a major research organization, holding the record for most U.S. patents generated by a business (as of 2020) for 27 consecutive years. Inventions by IBM include different fields as the automated teller machine (ATM), the floppy disk, the hard disk drive, the magnetic stripe card, the relational database and others. [4]

### 4.2 Microsoft Technology Licensing LLC

Owns the vast majority of patents formerly owned by Microsoft Corporation. It develops, manufactures, licenses, supports, and sells computer software, consumer electronics, personal computers, and related services. In 2016, it was the world's largest software maker by revenue (currently Alphabet/Google has more revenue). [5]

## 5. Patent Searches at Online Patent Database

Patent searches have a business focus, therefore, during the exercises in the discipline of "IP and business", we are preparing students to carry out these patent studies. Below we present the methodology for conducting patent search in accessible online databases for patent applications and patents granted in IP education and digital learning. [6]

### 5.1 Determining the Parameters of a Patent Search

The purpose and subject matter of this patent search is to identify the patent applications and patents granted in IP education and digital learning internationally. The territories covered by the study are China, USA, South Korea, Japan, Australia, Russia, Taiwan, PCT applications and EP applications. The countries surveyed were selected due to the fact that these territories have the most patent applications and patents granted in IP education and digital learning. The patent study covers the period from January 2000 to April 2020, or a total of 20 (twenty) years. The patent search is carried out at the European Patent Office's online database and Lens Online Database.

### 5.2 Systematization of Patent Documentation

The systematization of the information was done by countries, by companies, as well as by the number of applications for inventions and patents granted.

### 5.3 Results of The Study and Analysis of the Information

The study was conducted, first on one subject (IP education) and then on another (digital learning), with a view to expanding the scope of the search.

*5.3.1 Statistics on patent applications and patent granted in "IP education" for the period 2000-2020*

The patent applications filed during the aforementioned period are 70 and the patents granted are 16.
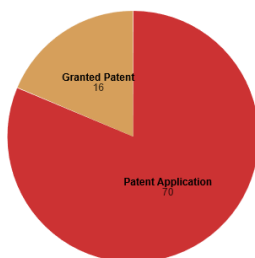


*Fig. 1. Patent applications and granted patent for the period 2000-2020*

During the period under review, patent applications to the territories of China, USA, South Korea, Australia, Japan, Russia, PCT applications filed with WIPO, as well as European applications submitted to the EPO were 70 in total, and only 16 were granted patents.

The largest number of applications for inventions and patents granted in the territory of the United States is in IP education – 48. WIPO ranked second after China, with 13 PCT applications submitted internationally, followed by Australia with 12 results, China with 5, Japan and South Korea with three results each.

| Country/Patent Office | Patents applications and granted patents |
|---|---|
| USA | 48 |
| World Intellectual Property Office (WIPO) | 13 |
| Australia | 12 |
| China | 5 |
| Japan | 3 |
| South Korea | 3 |
| European Patent Office | 1 |
| Russia | 1 |

*Table 1.*

**Table 2** lists the applicants with the highest number of applications submitted in IP education, namely:

IBM – 4 patent applications and granted patent, KALLURKAR SRIKANTH V – 3 results, ELAD JOSEPH B – 3 results, COLBRAN STEPHEN – 3 published documents, JOHNSON APPERSON HUNTER – 3, BLOOMBERG LP – 3.

Applicants

| IBM | KALLURKAR SRIKANTH V | ELAD JOSEPH B |
|---|---|---|
| 4 | 3 | 3 |
| COLBRAN STEPHEN | JOHNSON APPERSON HUNTER | BLOOMBERG LP |
| 3 | 3 | 3 |
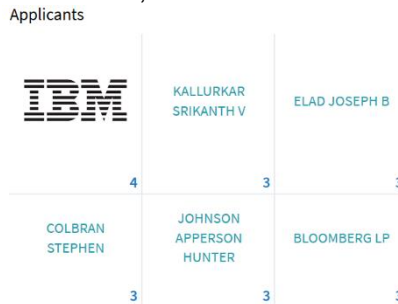
*Table 2.*

*5.3.2 Statistics on Patent Applications and Patent Granted in "Digital Learning" for the Period 2000-2020*

The inventions filed in the aforementioned period are 8572, the patents granted are 3190.

The relationship between the patent applications and patents granted for the period 2000-2020 is shown in **Figure 2**.

Granted Patent
3,190

Patent Application
8,572
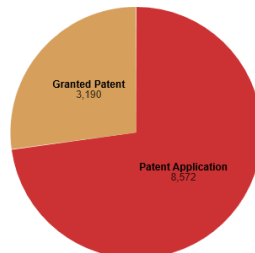
*Fig. 2.*

During the period considered, patent applications in China, the USA, South Korea, Australia, Japan, Canada, the United Kingdom, Taiwan, including those filed under the WIPO and EPO, totalled 8572, and patents for the invention granted are 3190. The total number of published patent applications in digital learning is almost three times more

than the patents granted in the same field. When analysing the results of the study on the total number of inventions filed and patents granted in the jurisdictions presented in the table below, we can conclude that the leading country here is undoubtedly the USA with 6111 documents, followed by applications submitted to WIPO – 1827 PCT applications, followed by China in third place with 1779 results and South Korea with 515 documents found. In fifth place is the EPO, which has 442 applications and patents granted, and Australia ranks sixth with 407 results. Japan is in seventh position with 365 documents; Canada is in 7th place with 72 results, Great Britain with 69 and Taiwan with 55 results.

| Country/Patent Office | Patent applications and granted patents |
|---|---|
| USA | 6111 |
| WIPO (World Intellectual Property Organization) | 1827 |
| China | 1779 |
| South Korea | 515 |
| European patent Office | 442 |
| Australia | 407 |
| Japan | 365 |
| Canada | 72 |
| United Kingdom | 69 |
| Taiwan | 55 |

*Table 3.*

The following table 4 lists the applicants with the highest number of patent applications and patent granted in digital learning, namely: IBM – 273 patent applications and granted patents, Microsoft – 190 results, Adobe – 135 documents, Adobe INC – 128 results, Microsoft Corp – 127, Sony Corp – 107.
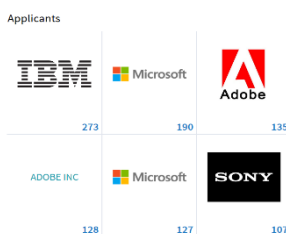


*Table 4.*

## 5.4 Conclusion of the Search

After analysing the results of the study, we can conclude that patent activity of the companies in the area of IP education is very low for all the period studied. Unlike the IP education search, the digital education survey has radically different results. It is important for each of the students, in addition to conducting the patent search, to be able to correctly draw conclusions and analyse the results obtained.

## 6. Conclusion

Stimulating innovation and investing in technological development has a direct impact on patent protection. Businesses need to understand the nature and importance of new knowledge, as well investing resources in new developments of the companies. In knowledge-based society, the knowledge of IP system as objects, rights and their management are a necessity in the education. [7] Obtaining patent protection for IP education and digital learning should be objective for the companies involved in this activity. They need to be aware of the advantages they have as patent holders – they must gain technological advancement, develop and apply innovation, protect innovative products as IP objects, and manage its IP in a way that enables it to generate profits.

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# Media Literacy and Higher Education in Epidemical Aspect: A Short Overview

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## Abstract

*Introduction: The modern world has entered a new phase of development, where it has had to form a new type of society in a difficult time - previously referred to as a future challenge. More than 300 million students worldwide are having their education disrupted by Covid-19. Universities haven't faced such level of disruption in generations. However, unlike any point in the past, now we have the ability to continue education even when universities physically close. New questions about how remote-learning can be delivered and improved are raised. An urgent one is the quality of the educational process in isolation and how to preserve the basic teaching principle. Presentation: The essence of this approach was not clear in terms of parameters, but it was known that it would be the result of the construction of **a new social phenomenon – education in isolation during a pandemic**. Real-time information sharing and cultural communication is already a fact. The challenge higher education systems face is improving the organization of the learning process and integrating traditional bases into new platforms. They need to be more operational and dynamic, allowing the capacity of huge volumes of data, but also be open to complement and correction. This can be achieved through the collaboration of all teachers from different fields so as to create a dynamic software product that will allow the creation of a system of different aspects of higher education. The paper aims to make a short overview of the diversity of forms of learning as a positive in work and how the creative atmosphere at the university motivates students for a meaningful learning process. Another aspect that has been addressed is the fact that, in social isolation, people should not be divided Conclusion: The huge role of media is to educate and bring up individuals. It is the bridge between ruling and vigilant people who complain but also ask questions, verify facts and worry, but also offer solutions. This is why **media literacy** for learners is crucial, especially in times of crisis.*

*Keywords: media, Covid-19, higher education, online training, distance learning, social isolation*

## 1. Introduction

The world shut down at home and opened up to a new kind of culture based on socialization through Internet. University education has entered the electronic environment with a flying start and is already a fact. Just as the spirit cannot be quarantined, nor can the thirst for knowledge. Life has moved in a new direction and raises new questions about the way of learning in the future and the opportunities for its improvement. An urgent question is the quality of the learning process. Another one is related to workload – staring at the screen for hours on is exhausting. Lack of direct contact with colleagues and teachers raises the level of anxiety, creates a feeling of insecurity, and leads to disorders.

## 2. Education During a Crisis

The basic principle of remote-teaching is to preserve the interest in the discipline and to develop knowledge in an online environment, which does not contradict the strategic goals of higher education. As Bill Gates said back in 1999: "...the era of personal computers has caused a real revolution that has affected millions of people. It took us where we could not have imagined. … Today we are embarking on a new great journey.

No one can predict where we will end up on this path, but I am confident that this revolution will touch even more people and move society far forward. Radical changes will occur primarily in communication between people" [1], that change has taken place.

Now the challenge is to improve the system for online-learning. This can be achieved through the joint work of teachers from different fields to create a dynamic software product aimed at research work in universities and education itself.

## 3. Positives and Negatives in Online Education. Advantages and Problems

The variety of educational forms turned out to be a positive. Something more: The right decisions are made based on experience and not just knowledge. [2] Through analysis and case studies, students draw conclusions and make concrete decisions. This is done purposefully so they can reveal their strengths, be active, diverse, and apply what is learned. This example is another new application of the theory of the American philosopher John Dewey [3], where the interaction of students with practical matter makes them more adaptable and more professionally literate. In other words, students placed in a situation with real life problems, guided by the teacher, solve the case, and gain new knowledge.

## 4. Sustainable Survival

Media today are more than ever rushing to create an information environment – dynamic and often noisier than useful. One of the most pressing issues is saving economies, but at a time when we are learning to live with the crisis caused by Covid-19, it is extremely important to have a rational conversation about social distance in terms of education, culture, intellectual capacity. At a distance, we cannot afford to stand divided. And here comes the huge role of the media, whose function is to educate and discipline. It is the bridge between rulers and complainers. But it is also there to ask questions, check facts, offer solutions. This way wandering between the themes of freedom, elections, the pandemic, Covid-19, students are involved in the adventure of information literacy, in particular copyright literacy in the media in the modern world.

The project "Model for research and increase copyright literacy at the media in the university environment", funded by the National Science Fund of the Ministry of Education and Science of the Republic of Bulgaria, considers intellectual property as a law, discipline and science, provokes discussions on the issue with the emphasis on copyright literacy and media literacy of students learning in specialties such as journalism, media, public relations, communications, or more generally in the professional field 3.5 "Social Communications and Information Sciences". Observations show that this competence is not at the required level, there is a real need for additional knowledge and training.

Within the project, the research examines the educational content and programs offered by higher education on the topic, as well as the formation of copyright literacy in the media of students learning in similar specialties in different universities. The accumulated factual information outlines the trend of awareness, level of knowledge and

practical orientation of skills in future professionals.

The results such as creative thinking and copyright competence in the field of media in a university environment will contribute to higher competitiveness of students in the labour market and to the establishment of an active civil society, and this is a prerequisite for advanced problem-oriented education of students, which in turn is a step towards changes in the legal infrastructure of culture in our country.

The significance of the project is due to the growing influence of the media in the international aspect, especially social and online media. In the 21st century there is an organized unification of various media industries – newspapers, radio, television, communication networks, in whole media complexes of a new model, that today carry out all the media activities, and soon are about to become a major market of the future.

We are witnessing a new type of mass culture, a new type of organization and management of society through information knowledge and products. The scientific interest in the problems and the current trends in the media industry in terms of copyright literacy in the media in the university environment is provoked by the need to fill some gaps in research in the media industry, as well as the fragmentary nature of research related to copyright aspects of media in a university environment.

We can summarize that the current project is interdisciplinary in its nature because it includes different areas of knowledge and helps to increase the media literacy and to solve digital divide problems. It also has a direct application in education at various levels and especially in the university environment. The current state of the studied issues shows that the problem of the media industry from the point of the legal framework in the field of copyright and related rights has not been studied. In recent years, the need to address it has been recognized, but there have been no concrete results.

## 5. Results

Human behaviour is different and research among our students shows that the lack of a system for copyright protection of journalists and their authors' materials raises the need to develop an information campaign and training courses to ensure information comfort for authors and trust for authenticity among users of such information. There is a need for the media to pay more attention to the new conditions faced by intellectual property in the media, to start preparation and consultations for the creation of a sustainable and effective strategy for improving the intellectual property protection/competence of their employees. Intellectual legal aspects in the media will become a part of new discipline that would train current and future journalists on intellectual property and copyright issues.

## 6. Conclusion

The media work around the clock to meet society's expectations. It is the history that will tell how successful they are. A report by the EBU [4], released a few days ago, found that the escalation of the Covid-19 situation around the world is increasingly directing the majority of the audience to the public media in order to receive reliable news and information based on verified facts. According to Liz Corbin, Deputy Director Media and Head of News at the European Broadcasting Union: "In times of national or international crisis, millions of people turn to public service television, radio… In the current crisis situation, public media journalists give their best they are able, in order to provide true, accurate and complete information as quickly as possible". Therefore, the work of these people must be respected, and the knowledge of this must be part of the learning process of students.

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# One Province, Two Education Models: Employers' Views of Graduates Produced by Both Conventional and Chinese-Foreign Universities in Guangdong Province, China

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## Abstract

*Presently, there are nine Chinese-Foreign universities marked with "legal person status (法人资格 in Chinese)" by the Ministry of Education of the People's Republic of China. These nine higher education institutions are the leading Chinese-Foreign universities in China, of which four of them are located in Guangdong province. By 2019, Chinese-Foreign universities in Guangdong province had produced eleven cohorts of graduates. It has been suggested in recent studies that, on average, these graduates enjoy a relatively higher salary in the first year of their employment compared to those who graduated from conventional Chinese universities. Does this imply that Chinese employers tend to value graduates produced by the Chinese-Foreign universities over those from conventional Chinese universities? Have the qualities sought in potential employees changed among Chinese employers? While the objectives of Chinese-Foreign universities have been understood as a more internationalized higher education institutions, little work has been published to address whether internationalized Chinese-Foreign universities give an education that is more relevant to society and industrial needs in Mainland China. In the eyes of Chinese employers, what are the qualities and skills of employees they are currently looking for in China's labor market? To answer the questions mentioned above, a survey with 100 first-line recruiters from 30 different industries in Guangdong province, China, has been conducted and examined in this paper.*

*Keywords: Chinese-Foreign universities, conventional Chinese universities, starting salary, personal quality, Guangdong province*

Chinese-Foreign universities have been a popular trend of internationalization in Mainland China since the 1990s [1]. According to the Interim Provisions for Chinese-Foreign Cooperation in Running Schools enacted in 1995, legal person status is granted to establish cooperative educational institutions independently, and the granted institution shall assume the responsibility of running education independently [2]. In 2003, the promulgation of the "Regulations of the People's Republic of China on Chinese-Foreign Cooperation in Running Schools" continuously granted Chinese-Foreign universities with legal person status to set up an independent board of trustees or board of directors [3]. Hence, this type of international higher education cooperation, as argued by Jane Knight, allows a high level of autonomy to the co-developed institution since the institution will not operate as a satellite branch of its parent institutions [4].

Currently, nine Chinese-Foreign universities marked with legal person status have been established across Mainland China, including University of Nottingham Ningbo

China, Xi'an Jiaotong-Liverpool University, New York University, Shanghai, Duke Kunshan University, Wenzhou-Kean University, Beijing Normal University-Hong Kong Baptist University, United International College (BNU-HKBU UIC), Chinese University of Hong Kong, Shenzhen, Guangdong Technion-Israel Institute of Technology, and Shenzhen Moscow State University-Beijing Institute of Technology University, of which the latter four are located within Guangdong province. In addition to the four Chinese-Foreign universities, 61 conventional Chinese universities are located in Guangdong province [5].

In 2019, there were 1,858 and 256,930 bachelor's degree holders graduated respectively from Chinese-Foreign universities and conventional Chinese universities in Guangdong province [6]. Recent studies have indicated that, despite being smaller in number, fresh graduates from Chinese- Foreign universities earn 77 per cent higher on average in the first year of employment compared to those of conventional Chinese universities [7]. What kinds of qualities and skills of fresh graduates are presently more valued by Chinese employers? Does this also reflect that there has been a change of personal qualities sought by Chinese employers while recruiting their potential employees? Moreover, is there any tendency to show that fresh graduates produced by Chinese-Foreign universities generally deserve and enjoy a higher starting salary concerning the English training and academic strength they attained? In order to answer the questions mentioned above, a survey was conducted during the "2020 Guangdong Province Recruitment Fair for Fresh Graduate and Urgently-Needed Talents" hosted by BNU-HKBU UIC on October 13, 2019. Through distributing questionnaires at the venue, more than one hundred opinions have been collected.

In the survey, our respondents are coming from 105 companies in different cities within Guangdong province, including Shenzhen, Guangzhou, Zhuhai, Zhongshan, Dongguan, Shaoguan, Enping, Jiangmen, Taishan, Kaiping, and Qingyuan. These companies belong to 30 industries, of which the most significant group comprises companies from the manufacturing industry (25%). It is followed by education (9%), information technology (8%), electronics (7%), new resources and new materials (6%), and retailing services (6%). Most of the respondents have engaged in the fresh graduates' recruitment process in the previous one to ten years, and over 50 per cent of them have accumulated at least five years' working experience as front-line recruiters for their companies.

According to the responses we collected, there are six qualities of competent fresh graduates hugely anticipated by the majority of Chinese employers, in which the most anticipated one is the ability to learn. Figure 1 below shows that 84 per cent of respondents prefer candidates possessing this characteristic. This figure also tells us that the second most anticipated working quality is a strong sense of responsibility (81%), following by adaptability (78%) and self-motivation (62%). Besides, results suggest that Chinese employers in the present time are looking for candidates with high passion for the industry or profession of which they are applying (57%). Chinese employers seek honest candidates, especially individuals who possess strong moral principles and personal integrity (52%).
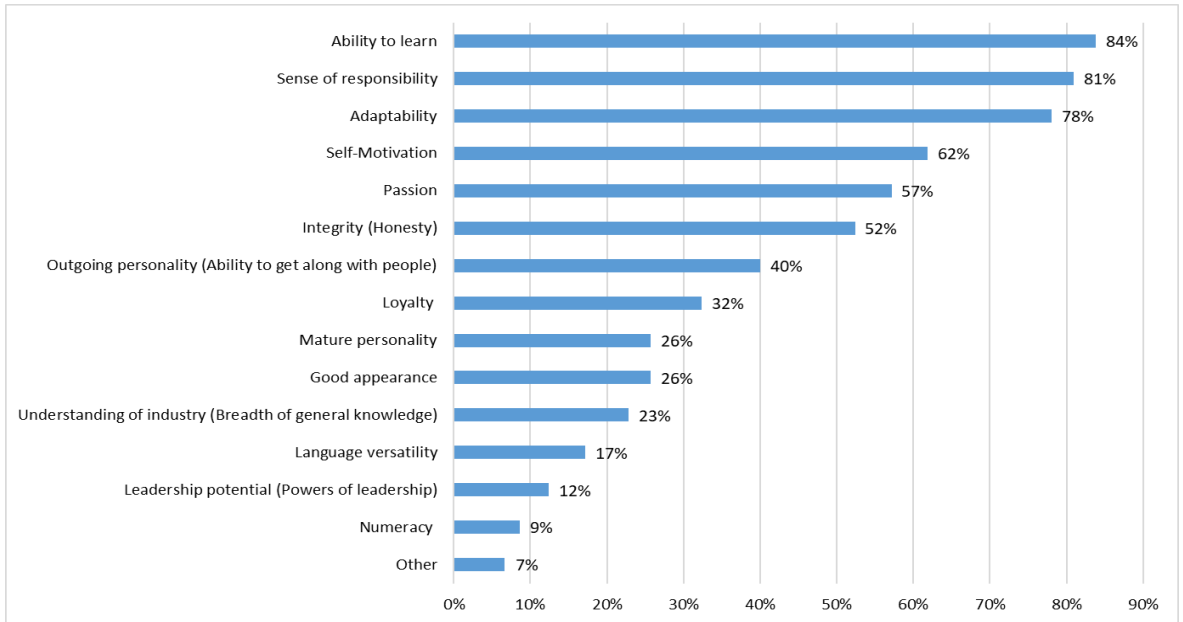
*Fig. 1. Specific qualities of fresh graduates favored by Chinese employers*

By comparing the surveys of personal qualities on fresh graduates we collected since October 2019 with the previous surveys, there is a significant change occurring in the recruitment plan among some Chinese employers in Mainland China. Chinese scholars have begun their studies on the same subject since the beginning of the twenty-first century. For instance, Peking University conducted its nationwide survey on fresh graduates' employment and recruitment strength in the job market, respectively, in 2003 and 2005. These previous studies show that most Chinese employers have not yet anticipated the personal qualities of each fresh graduate. Personal qualities, as we mentioned earlier (i.e., ability to learn), a strong sense of responsibility, adaptation, self-motivation, passion, and honesty, were not required in the workplace back in 15 years ago. Instead, Chinese employers were usually looking for potential candidates based on their academic performance, particularly the scores each candidate attained in his/her grade point average (GPA) [6]. A Chinese survey conducted in 2007 indicates that active participation in extra curriculum activities and volunteering social works and services would increase students' competitiveness in the Chinese job market after graduation [8].

As in 2013, a survey further indicated that there had been an evident tendency among Chinese employers to recruit fresh graduates who engaged actively in student leadership and organizations like sports clubs and other social work and services [9], [10]. Such changes have marked an increasing preference among Chinese employers toward the personal qualities of fresh graduates. Chinese employers have seen student participation in student clubs and activities as a reference to measure strong leadership and desirable personal qualities. At the same time, some scholars also inferred that fresh graduates equipped with such abilities are more likely to receive a higher starting salary in their first job [11].

Inspired by the precious Chinese studies, it is crucial to examine further whether higher starting salaries among fresh graduates from Chinese-Foreign universities are attributed to their strong personal qualities shaped by the international learning curriculum and English-speaking environment. In this paper, our respondents were

asked to consider and compare nine personal qualities of fresh graduates from Chinese-Foreign universities with the conventional Chinese universities in China (see Table 1 and Figure 2 below). In general, our respondents can be divided into two groups: Group A and B. Group A includes 51 respondents who used to recruit fresh graduates from both types of the university. Group B, on the contrary, are 53 respondents who used to recruit fresh graduates only from conventional Chinese universities in the past, of which last October was their first time to recruit potential fresh graduates from a Chinese-Foreign University, BNU-HKBU UIC. We discovered that 88 per cent of Group A recruiters were aware of the differences between students trained by Chinese-Foreign universities and conventional Chinese universities. Referring to Figure 2, 56 per cent of these respondents consider fresh graduates produced by Chinese-Foreign universities more confident than their counterparts trained in the current Chinese educational context.

Meanwhile, the respondents also generally believe that the students trained by Chinese-Foreign universities are more creative (40%) and show more diversified personalities (36%) than the fresh graduates from conventional Chinese speaking universities. However, only a small number of recruiters in Group A think that fresh graduates trained by Chinese-Foreign universities have stronger self-motivation (20%) and leadership potential (7%) than the students in conventional Chinese universities. In this sense, it can be inferred that Chinese employers have seen the Chinese-Foreign university graduates' as less motivated or less competent candidates for the current Chinese workplaces.

| Personal qualities of fresh graduates | No. |
| --- | --- |
| Students from Chinese-Foreign universities are more able to adapt to an industrial environment | Bar 1 |
| Students from Chinese-Foreign universities are more confident | Bar 2 |
| Students from Chinese-Foreign universities are more creative | Bar 3 |
| Superior environment at Chinese-Foreign universities produces many differences in personal qualities | Bar 4 |
| Students from Chinese-Foreign universities have greater leadership/management potential | Bar 5 |
| Students from Chinese-Foreign universities are better at logical and analytical thinking | Bar 6 |
| Students from Chinese-Foreign universities have a more mature outlook | Bar 7 |
| Students from Chinese-Foreign universities have greater motivation | Bar 8 |
| Students from Chinese-Foreign universities are more 'socially complete' | Bar 9 |

*Table 1. Personal qualities of fresh graduates*
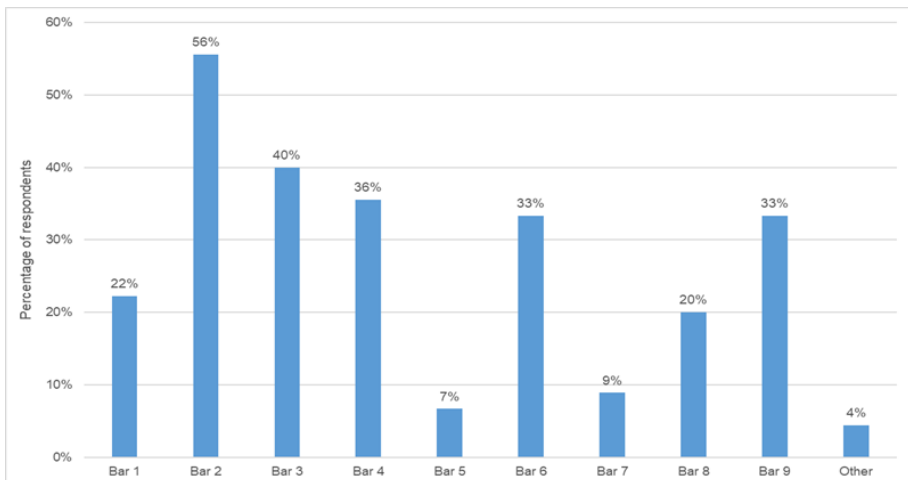


*Fig. 2. Group A recruiters' observation of the personal qualities of fresh graduates*

In order to obtain how far the recruitment experiences have affected the Chinese employers' expectations concerning the personal qualities of fresh graduates from Chinese-Foreign universities, Figure 3 below compares Group A's and Group B's expectations of the nine personal qualities listed in Table 1. As illustrated in Figure 3, recruiters in Group A tend to anticipate more qualities concerning self-motivation (bar 8) and leadership potential (bar 5) among the fresh graduates produced by Chinese-Foreign universities compared to those in Group B. A Figure 3 also demonstrates that the majority of Group B's recruiters prefer to hire fresh graduates from conventional Chinese universities since they have less experience in recruiting fresh graduates at Chinese-Foreign universities. However, recruiters of Group B have generally attained higher expectations toward the fresh graduates from Chinese-Foreign universities than Group A. This tendency might be attributed to the more potent abilities among the fresh graduates trained in Chinese speaking universities. The abilities include their adaptability and competency in industrial, management, and social environment in China.
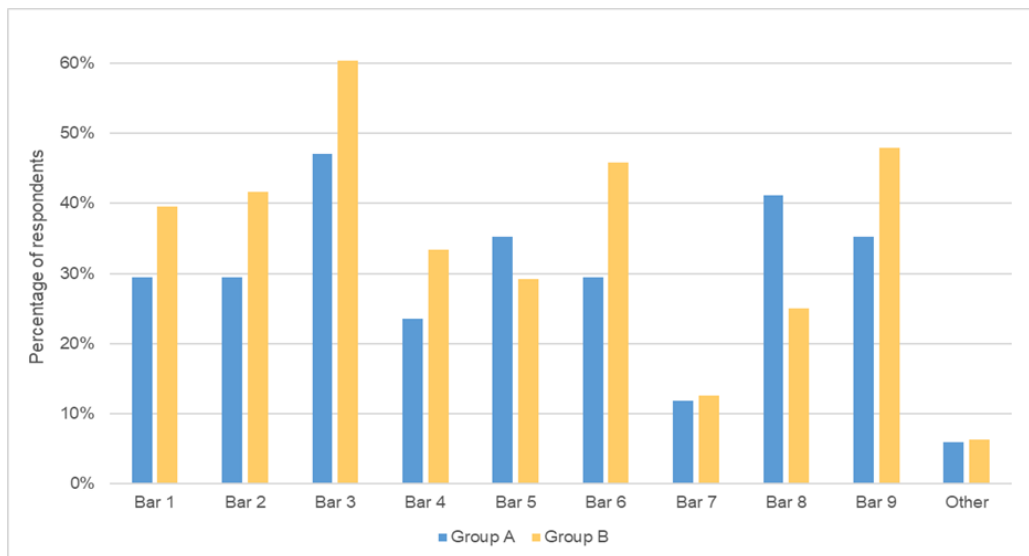


*Fig. 3. Group A's and Group B's expectations of the personal qualities of fresh graduates*

Finding a job after graduation has been one of the major themes of higher education in China. In this paper, our survey aims to provide some new insights into this theme by comparing two educational models that are presently prevailing in Guangdong province since the early twenty-first century: Chinese-Foreign universities and conventional Chinese universities. Based on our preliminary analysis, it is apparent that many Chinese employers are more inclined to recruit fresh graduates with the following outstanding personal qualities, particularly the ability to learn, a strong sense of responsibility, adaptability, self-motivation, passion, and integrity. Besides, our survey reveals that Chinese employers appreciate the confidence, creativity, and diverse personality of fresh graduates trained by Chinese-Foreign universities. At the same time, they further expect a strong self-motivation and leadership potential from these graduates. Noteworthy, their high expectation toward fresh graduates from Chinese-Foreign universities is held by recruiters who have not yet hired any employees from these universities. The higher expectation implies that despite the tendency for recruiters to possess strong confidence toward the Chinese-Foreign universities and its fresh graduates, the confidence may

have been coming from the worldwide reputation of the foreign higher education institutions rather than the individual personal qualities. Therefore, Chinese-Foreign universities need to nurture strong personal qualities for their students, especially with respect to social adaptability, industrial competency, and leadership skills within the working environment across China because the school's reputation will not produce a sustainable and competitive advantage for their graduates in the long run.

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# Practical Guide to Tutor an End-of-Degree Project

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## Abstract

*The tutoring of end-of-degree projects presumes that the tutor or supervisor will have to be a support for the student. However, it is presumed that students must have skills of sufficient level to develop the work by themselves, but is this true or do they still need tools to develop certain skills necessary for research? Besides, several obstacles that are common to most students have been detected, for example, what topic to choose, how to look for information, how to cite other studies, what is the research question or main contribution, as well as others derived from the expression and communication of the project. Sometimes, tutors do not have an established protocol for tutoring, but it is based on their own experience. For all these reasons, in the last year we have implemented a tutoring guide that makes students see their project as an achievement of steps to be overcome, and where both parties have the necessary tools to develop the research in an efficient way. This experience shows the usefulness of this guide from the perspective of the students.*

*Keywords: Tutoring, end-of-degree project, Guide, Tools*

## 1. Background

The European Higher Education Area (EHEA) opens a space that favours the mobility of university students, as well as their employability in European countries. In this space, European universities set up the educational pacts signed in the Bologna Treaty [1]. One new requirement introduced in the degrees from 2010 was the compulsory research work to end the degree. Hereafter, we will refer to it such as the "end-of-degree" (EOD) project.

According to the EHEA, students should write an end-of-degree project consisting of an original, autonomous and personal work, under the guidance of a teacher, in which the knowledge and skills acquired throughout the degree are applied and developed, demonstrating that they have achieved the competencies provided in the study plan [6].

Although students are supposed to be prepared to carry out this project since they have allegedly acquired the sufficient skills during their previous training, unfortunately this is many times not the case. It is common for students to have had tasks based on the completion of reports during undergraduate training; however, these were usually carried out in groups to enhance collaborative work skills. Teamwork has been a fundamental activity in university education, due to the multiple advantages offered by this technique during working life [5]. The use of this technique requires that each participant assume a role within the team where their responsibilities are interdependent to those of the rest. In addition, not only technical knowledge is used on the topic to be discussed, but also soft skills such as leadership, coordination, conflict management, among others, are important [4]. Even in those experiences where the group does not work together and they are limited to a distribution of smaller tasks which will later be

joined and will form the result, the students have feelings and motivations that will make them feel better. Students who participate in teamwork receive messages such as the following: *"the group helps me get the job done even if my contribution is not brilliant"*; *"if I don't know how to do a task the group will give me support"*; *"The result of the work does not depend exclusively on me"; "the amount of work I have to do is small"*.

However, when they have to face to the EOD project, they have to work on their own.

Besides, the EOD project should have sufficient scientific rigor; its workload is like any other subject (in most degrees it involves at least 6 ECTS credits); it can be published in an open access database, and it must be original and a good contribution to the field of study. Nevertheless, in this case they do not have the support of the teamwork [3, 4]. It is said that many of the soft skills that students have acquired in their groups will be very useful for the development of their EOD.

Following this line of thought, Figure 1shows the positive and negative emotions of EOD students from the moment they request a research area and a tutor until the moment in which they defend the work done.
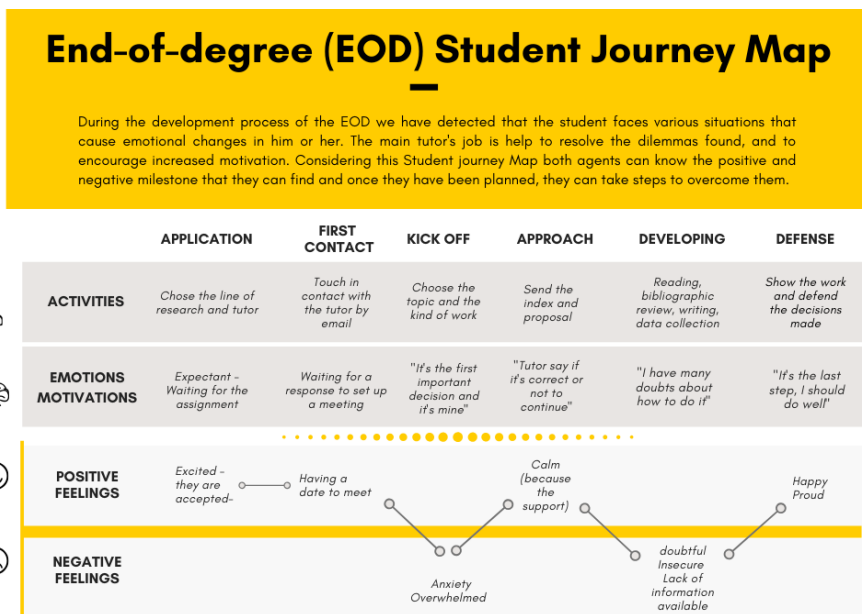


*Fig. 1. End-of-Degree Student Journey Map. Source: Own Elaboration.*

EOD students will have positive emotions in those moments when they interact with the tutor since this provides support, proposes improvements or corrections, and in some way, the feeling of collaborative work that have been experiencing during the degree is imitated. In addition, there is a positive feeling at the time of defence of the project, since students have eliminated all their fears regarding its completion, and they feel empowered for a challenge like the one he has just overcome. Happiness and personal pride are the most common feelings in this last phase.

Instead, there are two points where the tutor-student relationship should be optimized, since generally they tend to be those that lead more easily to the perception of student's negative feelings. The first of all is the lack of a closed line of work offered by the tutor. The pattern that the student has been following during the degree is to receive clear instructions to do a project, but in the mentioned situation, the student has

to think the specific topic to be developed in the EOD and how, considering the knowledge area and experience of the tutor. Students perceive this first task as a task of great responsibility since the originality of the work, the availability of data and sources of information to analyse the question posed, and even their motivation throughout the work will depend on the choice of the topic. Until all these doubts are dissipated, the student may feel anxious about this task.

On the other hand, once the tutor has approved the topic and they have thought of a work structure, it is common for the student to have unpleasant sensations in the face of the doubts that arise from doing a job of this type individually: i.e., how to search for quality information in databases, how to properly cite, how to collect data and analyse the information, or simply, how to know if the writing style is adequate and understandable. For all of the above, we want to provide tools that could facilitate the development of these phases, minimizing the negative feelings of the student and strengthening the tutoring relationship. These tools will be provided and developed in the following section.

## 2. Tools to Improve the EOD Student Experience and Results

Previous experiences as EOD tutors have made us understand that the initial phase, where students should look for a topic and plan the whole project, has been the most complex for them. For this reason, we prepare four files to fill in and try to clarify initial doubts or help students with their EOD.

### 2.1 Systematic Student Guide

The feeling of uncertainty is paralyzing at times, as ignorance exposes us to many unfounded fears. The first tutor-student meeting aims to discuss together what steps to follow in the development of the project.

In this proposal (see Fig. 2), we divide the EOD project into 5 phases: contact; search for the idea; initial research on the topic; production of the manuscript and finally, defence and presentation. In this infographic, the student knows the tasks he will perform in each phase. Dividing a large task into several small ones makes the challenge easier to take on and speeds up its completion. On the other hand, at the bottom of the table are suggested tools that will be useful for the development of each task. In short, this could serve to reduce the negative feeling of anxiety or doubts during the development of the EOD project, since at all times they would have in mind the guide to follow.
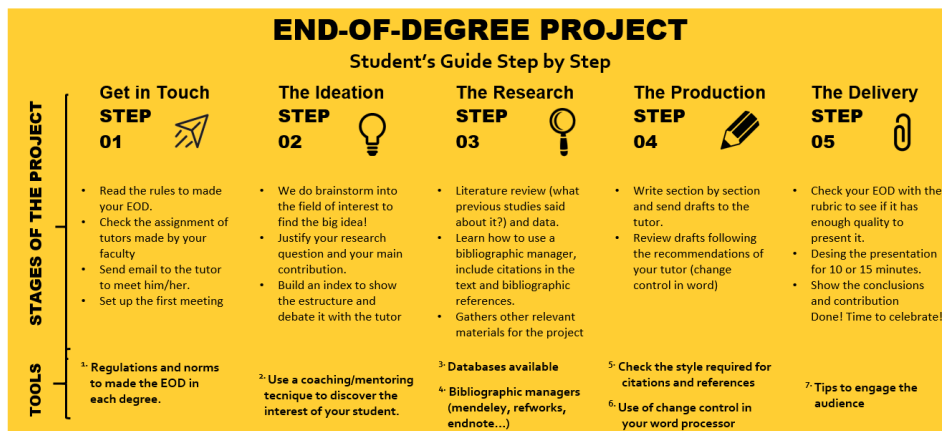


*Fig. 2. Systematic Student Guide. Source: Own Elaboration*

## 2.2 Student profile

In this file, the tutor can set a deadline taking into account students availability, know their current motivations through the subjects they liked the most and the least, their future motivations according to the type of job they would like to do, and also their strongest skills and others they want to improve.

This sheet allows tutors to help students during a session based on coaching, that is, not making the tutor imperative decisions but asking and letting students make the decisions that determine the direction of their work. It is true that with this information, it is not possible to determine the topic on which the EOD project will be carried out, but it does allow to brainstorm possible ideas derived from the present and future interests of the students, as well as their strongest abilities.

| STUDENT PROFILE | | | | |
|---|---|---|---|---|
| Name and Surname | | | Degree | |
| Email address | | | Telephone (opt) | |
| **RELEVANT INFO** | **TIME** | **STRENGTHS** | **WEAKNESSES** | **FUTURE** |
| | Desired date to finish the EOD project: | Mention 3 areas/subjects that you like the most during the degree | Mention 3 areas/subjects that you like least during the degree | What would you like to work on in the future? |
| | Time availability (any limitation) | Which are your strongest skills? | In which skill do you need more support? | What problem would you like to solve? What topic would you like to cover? |

*Fig. 3. Student Profile. Source: Own Elaboration*

1. **The ideation files.** This file helps to make a proposal for the topic by answering the W's research management matrix (*What? Why? Where? Which?*). Once students answer these four key questions, they can start with the initial bibliometric search to find out what is known so far about the topic and the most relevant authors who have dealt with it. This is a very effective tool to start focusing the work and generate a tentative index, which will allow them to go to step three, the investigation.

| WHAT DO YOU KNOW ABOUT THIS TOPIC? | |
|---|---|
| About what topic would you like to research? Do you have any experience in it? | |
| **RESEARCH MANAGEMENT MATRIX** | |
| **WHAT** is the research question? | **WHY** is this topic relevant/original? |
| **WHERE** can you find the data? | **WHICH** method are suitable to analyses them? |
| **BIBLIOMETRIC SEARCH** | |
| **Keywords** | |
| **Relevant authors in this line of research** *SOURCES: Orcid, Google Scholar, Scopus, research Gate, etc.* | |
| **What is known about it until now? What would be your contribution?** | |

*Fig. 4. The ideation files. Source: Own Elaboration*

2. **Guidelines for Evaluation.** It is an evaluation rubric to know the level of rigorousness and its relation to the desired final grade. When students know this from the start of the EOD project, it is easier to know exactly what level the project is at all times, and they have the opportunity to improve those weakest points. Despite keeping this in mind during the project, it is advisable to revise this checklist in phase 5 before making the final submission of the project.

## GUIDELINES FOR EVALUATION

| LEVELS | ☐ LOW (C) | ☐ MEDIUM (B) | ☐ HIGH (A) |
|---|---|---|---|
| **Purpose of the work** | ☐ The project does not present objectives, nor does it justify the topic. It is a mere collection of information. | ☐ It presents clear and ambitious objectives, some unrealistic. | ☐ The project presents clear and justified objectives, addressed professionally and realistically. |
| **Theoretical Framework** | ☐ The project has no theoretical framework, nor does it deepen the knowledge of previous works. | ☐ The theoretical foundation is well structured but the number of references seems insufficient. | ☐ The theoretical foundation is well structures, contains sufficient references and includes personal contributions. |
| **Research Question** | ☐ Research question has already been addressed in other studies and the contribution of this work is very low. | ☐ Research question is well justified. | ☐ Research question is well justified and it is clearly detailed in a hypothesis, identifying the variables affecting the research. |
| **Quality content (data and information)** | ☐ The student does not make a contribution of new content. | ☐ The content (data and information) collected in the End-of-degree Project are sufficient to address the topic. | ☐ The content (data and information) collected i the End-of-degree Project are of great quality and quantity, which allows to addres the topic professionally |
| **Methodology (data analysis)** | ☐ The student does not explain the methodology used or it is not suitable for the type of analysis. | ☐ The mythology suits the needs of the project. | ☐ The methodology is adapted to the needs o the projects. The proje explains the collection data as well as the analysis or tests performed. |
| **Conclusions** | ☐ Weak conclusions or not related to the topic. | ☐ Conclusions related to the topic, without discussion or personal opinion of the student. | ☐ Appropriate conclusion elaborated in a person way, discussing previo results. |
| **Writing and cohesion** | ☐ The text is complex to understand, unclear or appropriate technical language is not used. | ☐ The text is easy to read, a simple presentation of the information is made using short sentences. | ☐ The text is easy to read it is cohesive (element of cohesion between paragraphs) and it presents technical language supported by visual descriptions. |
| **Use of references** | ☐ The project hardly includes references, so that the student does no rely on any previous work to prepare the theoretical framework. | ☐ The project presents sufficient references in certain descriptive parts, but it does not present an analysis of previous works. | ☐ The project presents sufficient references along the research, it exposes an analysis of the results of previous works and generates a original contribution. |
| **Format** | ☐ The project does not follow End-of-degree project regulations (length, format, font, abstract, table of contents...) | ☐ The project does not follow some End-of-degree Project regulations (length, format, font, abstract, table of contents…) | ☐ The project follows the End-of-degree Project regulations (length, format, font, abstract, table of contents...) |

*Fig. 5. Guidelines for evaluation. Source: Own Elaboration*

## 3. Conclusions

Previous experiences as tutors have made us understand that the initial moment when students look for a topic and plan their EOD project is the most complex for them due to the uncertainty and fears they face. For this reason, we have prepared four files to fill in in order to clarify initial doubts or help students with their EOD project. The aim of using these tools are twofold. On the one hand, tutors manage to alleviate the negative feelings that many students develop in the choice of the idea and in the development of the EOD project. On the other hand, we have been able to experience greater efficiency and better results from our students when they have had these tools in mind, since it reduces uncertainty, streamlines the task by being a cluster of small sequential tasks, and helps to meet the established objectives.

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# Significance of Entrepreneurs' Education for Competitive Performance in International Business Environment

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## Abstract

*This paper examines the connection between entrepreneurs' education and the successful performance of enterprises in international business environment. The entry into foreign markets and the expansion of their presence abroad is connected with a set of knowledge and skills that entrepreneurs/managers and key specialists responsible for the internationalization of business possesses should possess. The paper presents the findings of a survey carried out among 500 Bulgarian enterprises that in some form have developed international activities. At the same time programs have been examined that prepare the students studying entrepreneurship-related disciplines for the specificity, opportunities and challenges in the course of internationalization of a business's operations. What has been taken account of is the expectations of the trained students that are the possible founders of their own business or will inherit their family firms. In the conclusions some inferences have been made about the education of future entrepreneurs, and the connection between the entrepreneurs' education and the successful performance of enterprises in international market. The experience of the enterprises that have participated in the survey carried out under this piece of research has been taken into consideration.*

*Keywords: internationalisation, education, entrepreneurship*

## 1.Introduction

Among the main challenges the Bulgarian economy is facing is the more active and successful presentation of domestic enterprises on the international markets. The rapid development of information and communication technologies in recent years and the process of globalization have posed new requirements to both business and education systems, and in particular, to the universities. These requirements refer to the creation of programs providing knowledge and developing students' skills, through which they can realize themselves professionally, including as entrepreneurs in a global environment. The preparation of adequate to modern conditions curricula should be based on the analysis of the entrepreneurs' characteristics who have successfully internationalized their enterprises.

In addition, the expectations and preferences of students studying entrepreneurial disciplines should be known. Some of the students are future entrepreneurs, who could he also motivated through appropriate training to create and develop companies that will be competitive in international markets. These circumstances assume an in-depth study of the relationships between the education of entrepreneurs and the internationalization of enterprises created and managed by them. It is also important to study the educational

trends in higher education, related to the preparation of future entrepreneurs. Some of these issues outline the research focus of the present paper.

## 2. Education and Competitive Performance of Enterprises

The presence of successfully performing enterprises on the international markets is important for the growth of the national economy and for higher quality of life of the citizens. In fact, the majority of Bulgarian small and medium-sized enterprises are not export-oriented and are focused mainly on the local market, which is characterized by limited demand for goods and services. At the same time, the process of globalization leads to higher competition even in the local markets where small businesses usually operate. This forces the small enterprises to improve their performance in order to survive [9].

The data show that Bulgaria is lagging behind other EU member countries in terms of foreign trade conditions, as it ranks 27 in the EU in the priority area of "Internationalisation" [6]. One of the main goals of the National Strategy for Promotion of Small and Medium-Sized Enterprises 2014-2020 is that by 2020 Bulgarian companies should not experience any difficulties when conducting foreign trade and the preparation of the documentation should be faster, easier and cheaper [6]. The achievement of strategic goals, which is due at the end of this year and increasing the export capacity of Bulgarian enterprises is also associated with the adaptation of curricula to the requirements of the business environment and the specifics of entrepreneurial practices.

At the EU level, it has also been found that potential entrepreneurs operate in a difficult socio-economic environment. The education does not offer a sufficiently suitable basis for an entrepreneurial career. It is also reported difficult access to credit, difficulties in transferring ownership, and concerns about public image in the event of failure and cumbersome administrative procedures [2].

In compliance with the EU policy Bulgaria adopted the "Entrepreneurship 2020 – Bulgaria" Action Plan. The document sets out specific measures, and in the first area of activity Entrepreneurial education and training to support growth and business creation includes measures like: nurturing entrepreneurial skills during the primary and secondary levels of education; updating entrepreneurial curricula in vocational training jointly with employers' organisations, updating curricula and entrepreneurial training programmes at higher schools and many others [1]. The literature points out managerial motivation, knowledge and resources as major barriers to strengthening companies' participation in foreign markets [7]. Other researchers show that the support for boosting export can have various forms, among which are education and training in export knowledge and skills, along with other measures [4]. The successful participation in international markets is closely related with the innovation capacity of the Bulgarian enterprises which should be reflected in the school and university curricula. A considerable and persistent gap in the innovation performance between the new and old EU member states has been observed. Most of the East European countries belong to the group of moderate innovators with one exception – Slovenia, while Bulgaria is a part of the group of modest innovators [11]. In addition, a key issue in today's global economic environment is the knowledge of intellectual property protection, as well as the achievement of competitiveness based on intellectual property [5]. In the process of internationalization, the education and the entrepreneurial experience play a significant role that should be considered [8]. Some of the qualities needed for entrepreneurial success like confidence, creative way of thinking, ability to identify the problems in details, willingness to change the familiar "ways of doing things", multitasking, ability to find support for their ideas and endeavours and others can be further developed through dedicated training [10]. This

poses new challenges to higher education institutions. Students should integrate the knowledge they acquired in various courses in order to implement successfully new methods in uncertain and dynamic business situations [3].

The study conducted among 500 enterprises in Bulgaria identified some relationships between training and companies' competitive performance in the international business environment. Empirical research was conducted under "*Determinants and models of the competitive performance of small and medium enterprises in an international business environment*" project, contract № ДН05/15 15.12.2016, funded by the National Science Fund, Ministry of Education and Science, Republic of Bulgaria. All companies that participated in the research have some experience in international business. The results show that in terms of the qualification of the entrepreneur-founder of the company nearly all respondents are well-educated as they hold a master's degree. This comes to prove that the companies that have internationalized their activity are founded and run by entrepreneurs with higher education. This trend persists among managers/successors of the studied enterprises. The majority of the companies, included in the research and having international experience, are run by managers and/or successors who are highly qualified, holding a master's degree. Therefore, these results indicate the importance of the university curricula at the higher education institutions where prospective entrepreneurs/managers are trained to perform successfully, including in an international business environment. The results also show that the entrepreneurs-founders of companies with international experience are mostly people who have majored in economic or technical degree courses. In the third place are those who have juridical education. This indicates the need for acquiring knowledge in the field of entrepreneurship and international business not only by those who major in economics, but also by students who study other degree courses, especially at the higher technical schools.

The curriculum of students majoring in "Entrepreneurship" at the University of National and World Economy – Sofia considers and reflects the new trends and requirements for business today. Some of the proposed courses directly aim at providing knowledge and developing skills for competitive performance of companies in the international business environment. The specific topics are studied that are typical for international entrepreneurship. Such courses are offered not only in the bachelor's level, but are also included in the master's degree program. Different methods are applied in entrepreneurship education, combining theoretical knowledge with real business cases.

When analysing the educational programs and their adaptation to the requirements of the turbulent and dynamically changing business environment, the attitudes and expectations of the students must be considered. The results of a study conducted among a group of second-year students studying an elective course in entrepreneurship show that in the future a significant part of them would like to start their own business.

More than, the majority of students assess appropriate education as a significant or very important success factor for people who wish to start and develop their own business. About half of the students surveyed say their families own a business. It can be concluded that the knowledge and the skills acquired in the educational system could influence to a certain degree the decision to establish a company, and subsequently be a prerequisite for its internationalization.

## 3. Conclusions

The creation and development of companies that are competitive in international markets is among the problems that focus the attention of entrepreneurs, managers, researchers, representatives of institutions and organizations promoting business.

Among the factors that are studied and analysed is the education of entrepreneurs and its connection with the successful performance in the international markets. The main conclusion of the surveyed internationalised companies is that these firms were created and managed by entrepreneurs/managers with higher education. The knowledge and skills acquired throughout their education, along with other factors, are probably among the prerequisites for making decisions to perform on foreign markets. It becomes clear that the majority of the students studying entrepreneurial subject, who participated in another study, state that they would like to start their own business. This poses a challenge to educational institutions to adapt their syllabi promptly in order to provide knowledge and skills that can adequately match the changing environment.

There is a specific group of young people whose families own their own business and who are potential successors for running and developing further this business. The knowledge about the internationalization of the business and its successful performance on international markets is of great importance to open economies like the Bulgarian, as well as to the individual companies.

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# Teaching Model in Economics Education, Based on the Interactive Connection 'Science – Education – Business'

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## Abstract

*The teaching model contains 4 main interconnected elements in the field of teaching students in Economics education based on the interactive connection 'science – education – businesses.*

1. *The results of researches made by the academic staff in business, entrepreneurship and science and technology are presented to the students in economic courses, including the current issues of economic development in an open global and digital economy.*
2. *In the process of academic discussion, students ask their questions about current topics relevant to business and the studies of academics. These topics are embedded in planned future research activities and projects of academic researchers.*
3. *Students undertake hands-on training in companies and institutions; thus, they are gaining knowledge and skills in business and for application in business.*
4. *The business sets requirements for students' knowledge and skills for the purpose of their full and effective application in the real business environment.*

*These relations between academic staff, students and business, following the line 'science – education – businesses are based on the principles of academic spirit and good business practices in the conditions of interactivity and conformism.*

*As a result, the presented teaching model the students achieve:*

1. *The students develop their analytical research skills, communication, presentation and discussion skills.*
2. *The students work effectively in the conditions of transparent discussion and open dialogical regime in the condition of the adequate effective implementation in a real business environment on the conditions to rapid answer relating to the real business course problem.*
3. *The students are motivated for searching new trends, new academic research results in the real business environment by raising questions and finding the adequate answer for implementation in a real business practice*
4. *The students are highly motivated in this process for creative thinking, for combinative research and implementation activities both: in the academic and in the business practice.*

*The academic lecturers take into account all of the elements of business analysis, entrepreneurship analysis and scientific technological research based on IP rights.*

*Keywords: Teaching, economic education, business, IP rights.*

## 1. Introduction

The teaching model with 4 main interconnected elements in the field of teaching students in Economics education based on the interactive connection 'science – education – business' aims to give students knowledge and skills as following:

1. analytical and research skills, communication, presentation and discussion skills.
2. to work effectively in the conditions of transparent discussion and open dialogical regime in the condition of the adequate effective implementation in a real business environment on the conditions to rapid answer relating to the real business course problem.
3. a motivation for searching new trends, new academic research results in the real business environment by raising questions and finding the adequate answer for implementation in a real business practice; for creative thinking, for combinative research and implementation activities both: in the academic and in the business practice.

## 2. Content of the Practical Part of the Course

Regarding point1. The results of researches made by the academic staff in business, entrepreneurship and science and technology are presented to the students in economic courses, including the current issues of economic development in an open global and digital economy.

For example, as an academic researcher in the field of intellectual property, in lectures on "IP in industry" I present to students the latest trends in the application and registration activity in the field of artificial intelligence with brief introduction.

Artificial intelligence[1], sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans.

Artificial intelligence was founded as an academic discipline in 1956, followed by new approaches, success and renewed funding and the sub-fields such as "robotics" or "machine learning".

In the early 1980s, AI research was revived by the commercial success of expert systems and forms of AI program that simulated the knowledge and analytical skills of human experts.

In the late 1990s and early 21st century, AI began to be used for logistics, data mining, medical diagnosis and other areas, statistics, economics, etc.

To the end of July, 2019, the system of patent search worldwide Espacenet[2] shows 4116 patent application and issued patent for AI.

The first application for AI was dated of 1996 year and for the 2017q 2018 and 2019 – more than 1200 per each year.

Foe the last 2019 year the EPO list of applications shown are the following.

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[1] AI as a content and sub areas described following the most common source: www.en.wikipeida.org
[2] www.epo.org/espacenet. The European Patent Office offers Espacenet as a free tool for free access to over 110 million patent documents for beginners and experts to perform patent searches for inventions and technical decisions from all over the world.

7/15/2019                                          Espacenet - results view

**Espacenet**

**Result list**

Approximately **4,116** results found in the Worldwide database for:
**artificial intelligence** in the title
Only the first 500 results are displayed.

| 1. ARTIFICIAL INTELLIGENCE BASED DISPLAY SYSTEMS AND METHODS | | | | | |
|---|---|---|---|---|---|
| **Inventor:**<br>LEE SENG FOOK [CN]<br>WANG ZHAOYUN [CN] | **Applicant:**<br>GUANGDONG GRANDEUR INT EXHIBITION GROUP CO LTD [CN] | **CPC:** | **IPC:**<br>G06Q30/00 | **Publication info:**<br>WO2019134348 (A1)<br>2019-07-11 | **Priority date:**<br>2018-01-02 |
| **2. APPARATUS AND METHOD FOR PROTECTING A DIGITAL RIGHT OF MODEL DATA LEARNED FROM ARTIFICIAL INTELLIGENCE FOR SMART BROADCASTING CONTENTS** | | | | | |
| **Inventor:**<br>KIM CHANG WON [KR]<br>SHIN DONG HWAN [KR]<br>(+2) | **Applicant:**<br>MARKANY INC [KR] | **CPC:** | **IPC:**<br>G06K9/62 | **Publication info:**<br>US2019213168 (A1)<br>2019-07-11 | **Priority date:**<br>2018-01-10 |
| **3. Virtual Adaptive Learning of Financial Articles Utilizing Artificial Intelligence** | | | | | |
| **Inventor:**<br>DO TIFFANY QUYNH-NHI [US]<br>DO JACQUELINE THANH-THAO [US] | **Applicant:**<br>DO TIFFANY QUYNH NHI [US]<br>DO JACQUELINE THANH THAO [US] | **CPC:** | **IPC:**<br>G06N5/02<br>G06N99/00 | **Publication info:**<br>US2019213486 (A1)<br>2019-07-11 | **Priority date:**<br>2018-01-06 |
| **4. Systems And Methods Using Artificial Intelligence For Routing Electric Vehicles** | | | | | |
| **Inventor:**<br>PEDERSEN ROBERT D [US] | **Applicant:**<br>PEDERSEN ROBERT D [US] | **CPC:**<br>B60L2240/622<br>B60L2240/64<br>B60L2240/66<br>(+23) | **IPC:**<br>B60L58/12<br>B60L58/16<br>G01C21/34<br>(+3) | **Publication info:**<br>US2019212161 (A1)<br>2019-07-11 | **Priority date:**<br>2017-02-22 |
| **5. Visibility meter of image analysis using artificial intelligence** | | | | | |
| **Inventor:**<br>채신태 | **Applicant:**<br>(주)시정 | **CPC:** | **IPC:**<br>G01S13/88<br>G06N3/02<br>G06T1/00<br>(+3) | **Publication info:**<br>KR101993445 (B1)<br>2019-06-26 | **Priority date:**<br>2018-03-05 |
| **6. API System for training and evaluation of english pronunciation using artificial intelligence speech recognition application programming interface** | | | | | |
| **Inventor:**<br>윤영훈 | **Applicant:**<br>윤영훈 | **CPC:** | **IPC:**<br>G06Q50/10<br>G06Q50/20<br>G10L15/01<br>(+3) | **Publication info:**<br>KR20190068841 (A)<br>2019-06-19 | **Priority date:**<br>2017-12-11 |
| **7. SYSTEM FOR PROVIDING ARTIFICIAL INTELLIGENCE INTERACTIVE COMMENTS TO AUTOMATICALLY REPLY TO ONLINE POSTS AND COMMENTS** | | | | | |

https://worldwide.espacenet.com/searchResults?submitted=true&locale=en_EP&DB=EPODOC&ST=advanced&TI=artificial+intelligence&AB=&PN=&AP=&P...    1/4

Most of the applicants are from the following countries: Korea and USA.

In Bulgarian PO are published more than 100 patent applications in this technological area.

Example: A manipulating and pacing robot with application bg112006 from 2016-11-30 inventor Ivan Chavdarov and applicant: Institute of system engendering and robotics of BSA with brief abstract: The invention relates to a pacing robot, which uses three support areas when moving. The same parts of the robot can be used for movements or for manipulating objects. This invention finds use in inspection and expedition, for rescue and reconnaissance operations and actions in terrains through which it would be hard to navigate. The combination of the ability to handle objects and move through specific terrain finds unconventional and industrial uses.

In the areas of registration activity for design: results for application and registration activity in RCD, for trends in the activity of Bulgarian and foreign companies in a selected

field: for example security design of software products Examples: in protected design solutions in classes 14-04 "Screen images and icons", including graphical user interface, computer icons and computer screen layout.



In the audience with the students we discuss and analyse facts and trends, in swot and factor analysis, as well as expected future developments.

We also study the policy of Bulgarian companies in the protection of their software solutions for web pages, computer icons and graphic design – over 68 designs for the last 5 years.
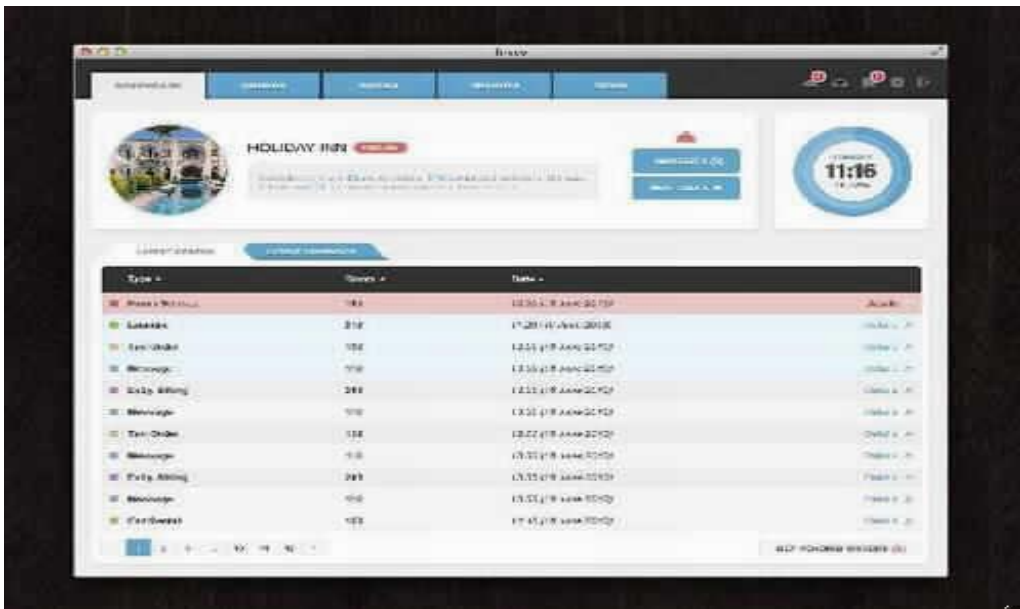


*Registered in 2015, interface design of company 'Invent Creative' LTD*

Regarding point 2. In the process of academic discussion, students ask their questions about current topics relevant to business and the studies of academics. These topics are embedded in planned future research activities and projects of academic researchers.

The discussion with the students identifies leading companies – researchers, leading companies – followers, Bulgarian companies with achievements in the field of new technologies for example: Company policy in the field of protection of design results: for example in the field of new design results for construction solutions especially registered industrial designs in the construction business in Bulgaria Industrial designs: the registered IDs are related to the constructions, including elements, profiles, booths, panels, concrete building blocks, lockers, doors.

Examples:
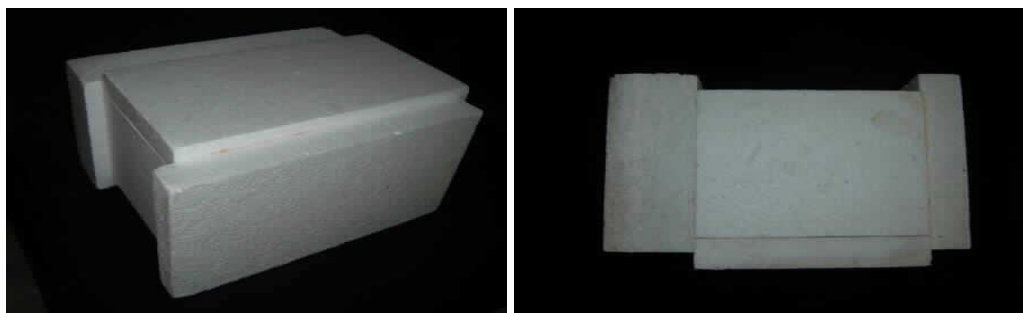


*Building thermo-isolated element 1/2017*



*Pavilion registered in 2012*

Summarize:

We identified high level of application and registration activity in IDs of constructive business for 10 years period with more than 600 acting IDs. Approximately 15-23% of all IDs annually for the years of weak activity /2011, 2015/, approximately 60% of all IDs annually activity for the years 2016 and 2017 in the different years in the 10 years period are in the field of constructive business. Then we analysed the business factors for this

ten-year period IDs activity.

Regarding point 3. Students undertake hands-on training in companies and institutions; thus, they are gaining knowledge and skills in business and for application in business.

As Included in the curricula for training students in economics is the conduct of the so-called practical training and company internship.

Students carry out practical training in institutions and companies, relevant to economic issues and their training. E.g., students in "Intellectual Property and Business" are trained practically in companies with consulting in the field of intellectual property.

In particular: carry out real research for protected innovations, for opportunities for protection of new technological and product solutions through IP objects: patents, utility models, designs, TEC, others when asked by clients of the company for potential protection of the company business identifiers.

For example: a holding company operating in the field of hotel services raised the question of the possibilities for protection of their brand TIVA DEL MAR. The students conducted a study of identical and similar marks containing this verbal element in 41 and 43 classes. They made a report from the study, which was presented to the company and company management decided and applied this mark for registration on national way on 28 of April, 2020 in Bulgaria.

Regarding point 4. The business sets requirements for students' knowledge and skills for the purpose of their full and effective application in the real business environment.

In the course of the practical training of the students in business, business in the person of the direct manager on site in the company they receive questions, cases for solving and specific tasks.

Thus, on the spot in the company, students are provoked to make decisions, to use the acquired knowledge and skills in the course of academic training and acquire new skills in business practice. For example, in the course of the student internship in the company "Microtel" Ltd. the management of the company raised the issue of protection of its new equipment for return of edged details. The main application of the proposed utility model is in the furniture industry. The model is also used in the production of stone and glass products in the details: steps, window sills, faceted glass and others, where machines are used for veneering and polishing edging, working on a similar principle.

The students conducted a study on innovations in the field of edging machines and presented a substantiated proposal for protection of innovation through a utility model in Bulgaria. The management of the company accepted the offer and applied within BPO.

These relationships between academic staff, students and business, following the line "science – education – business", are based on the principles of academic spirit and good business practices in the conditions of interactivity and conformism.

## 3. Conclusions

The presented teaching model has many advantages:
A. For students:
1. develop their analytical research skills, communication, presentation and discussion skills.
2. work effectively in the conditions of transparent discussion and open dialogical regime in the condition of the adequate effective implementation in a real business environment on the conditions to rapid answer relating to real business course problem.
3. a motivation for searching new trends, new academic research results, for finding the adequate answer for business practice.

B: For academic researchers/lecturers
1. to share and provoke their thinking in an academic environment.
2. to identify new problems for which they will seek solutions in the future.
3. to takes into account all of the elements of business analysis, entrepreneurship analysis and scientific technological research based on IP rights.

C: For business:
1. to receive the latest academically substantiated information.
2. to set alternative solutions for its issues.
3. a motivation for combinative thinking and implementation the academic results in the business.

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# Teaching Television Business.
# Binding Theory to Practice and Practice to Theory

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## Abstract

*The course is taught to students in their final year of bachelor study and aims for them to:*

1. *Acquire theoretical knowledge of the contemporary television industry in Bulgaria and understand the role of digital technologies and intellectual property in its development and for achieving digital competitiveness.*
2. *Acquire skills for solving practical cases.*
3. *Have media literacy regarding the recognition and use of official sources to obtain reliable information in practical cases.*
4. *Acquire and develop systemic learning, presentation and teamwork skills*

*Some of the activities involved in the learning process to achieve the above goals are:*

1. *Each topic of the course ends with the presentation of specific practical cases, that help students to get to know the practice and to be able to apply the lessons learned during the lecture in solving the cases.*
2. *As additional extracurricular work, students select relevant topics and practical cases for discussion at the beginning of the next lecture.*
3. *Attention is paid to the development of digital technologies for the creation and distribution of television products.*
4. *At the end of the course, students have an exam testing their theoretical knowledge on the subject matters.*
5. *In addition to the television industry, students also study disciplines regarding other creative industries. At one of the last lectures in Television business, when they have acquired theoretical knowledge in those other disciplines as well, students are divided into groups of 5 to 10 students. Each team works in a group activity: identifying the inter-industrial connections of the television industry with one of the following industries: music, film, publishing, telecommunications, software. The groups present their findings during the last class activity.*

*During the training the teacher monitors each student – the acquired and demonstrated knowledge, teamwork, presentation of ideas, cases and other project activities. On this basis, an assessment is formed, which enables the students who perform best during the semester to be exempted from the discipline exam with a high grade.*

*Keywords: Television industry, intellectual property, digital technologies, new business models, digital competitiveness, teaching*

## 1. Introduction

The course 'Television Business' is thought to students in their final semester of bachelor degree on specialty 'Creative Industries and Business'. So far, the students have learned the fundamentals in intellectual property system and its objects; copyright and related rights, creative industries, and now have the opportunity to cultivate theoretical and most important – relevant practical knowledge of intellectual property management in different creative industries and the interrelationships between the participants of those industries. These relations arise in regards to the use and management of intellectual property rights in the processes of creating and distributing creative products. Television industry is one of the most dynamically developing ones in Bulgaria and is directly dependent on the processes of digitalization, as a result of which many new business models emerge both in the creation and distribution and consumption of television products.

Therefore, in addition to theoretical knowledge, the priority of the television business course is to provide students with an opportunity to learn on specific practical cases from business in Bulgaria. By considering and working on such cases, students have the opportunity to acquire specific practical knowledge of how theory can actually be put into practice.

## 2. Achieving the Necessary Theoretical Basis

Before proceeding with the introduction of concrete practical cases and the analysis of such cases, it is necessary that students acquire basic theoretical knowledge about the nature and characteristics of the television industry and the role of intellectual property in it. Following the method from general to private, students' theoretical preparation begins with the identification of the different types of creative industries in Bulgaria and the presentation of their characteristics. Then the course continues specifically to the positioning of the television industry in the creative economy of the country and identifies the main structural units of the television industry, incl. individuals with and without creative contributions, small, medium and large enterprises, Bulgarian National Television, regulatory bodies, collective rights management organizations, various associations and others. The roles they all play in the television industry are determined. In parallel, the main national regulations defining and regulating the activity of these structural units are identified.

An important place in students' theoretical preparation is a thorough examination of the role of intellectual property – on the one hand as a resource for the television industry's activity and, on the other, as a means of protecting the products resulting from that activity. It is important for students to be able to identify the manifestations of the relationships that the television industry maintains with other creative industries, in particular the music, film and publishing industries. It explores which of the structural units previously identified in the television industry have intellectual property rights on television products or other works included therein, and examines the content of those rights. Students acquire knowledge of the television industry's utility chain, and of the various types of television products.

In Bulgarian television industry, in recent years, active processes of forming business concentrations have been observed – not only between enterprises in the creative sector, but also with the participation of telecommunications ones. Students learn that this is both the result of active digital technology development processes, but also a cause for the emergence of new business models for the distribution of television products in digital environments. Television companies or business concentrations that

implement digital distribution strategies for their products, provide consumers with the opportunity to consume television products at their chosen time and place, i.e., in a non-linear way, which, in the face of ever-increasing competition, helps them gain competitive advantage. The acquisition of digital distribution rights for television products and for the intellectual property objects included in them, as well as the investments by television companies in means of digital distribution of television products or partnerships with other organizations that have already established such infrastructure and means, are factors for the acquisition of digital competitiveness by these enterprises.

The theoretical knowledge achieved by every student is tested with an exam at the end of the course.

Crucial part for the preparation of students for being specialists in the subject matter of business with intellectual property in the television industry is the practical part of the course which is not concentrated at the end of the course but mandatory presents in every part of it. That is why the exam on theoretical aspects of the course is not enough for successfully finishing the course.

## 3. Practical Part of the Course

In addition to the theory that students learn during the course, there are practical activities during the whole course. The following approaches apply each of which builds on the previous one.
1.   Presenting relevant practical cases by the lecturer.

Students are presented with relevant cases from the Bulgarian television industry after each topic of the course. In this way it is easier for the students to master the theoretical material that has been taught and see its concrete manifestation in practice.
2.   Presenting relevant practical cases by the students.

As additional extracurricular work after each lecture some of the students are asked to find other practical cases (connected to the relevant topic) which they find interesting and which they will present at the beginning of next lecture. They are encouraged to choose alone the means for the presentation – traditional PowerPoint presentation, Google Slide, Prezi or any other program by which they can present their findings on the case. Giving them the opportunity to choose both the case and the way of presenting it, aims at stimulating student's personal interest on the particular topic as well as in forming personal approach to presenting it.

It is important to state here that being a part of the media industry, television industry is also affected by the existence of fake news or news from unreliable sources that has not been checked but which are yet being disseminated among the audience. When working on a particular case to present during the lecture, students must be able to find information on it that is true, reliable and checked, and that comes from official sources.

This is observed by the lecturer during the presentation of cases by the students and if information of such sort is presented during the presentation, its unreliability or falseness is communicated with the students. In this way students obtain media literacy as well.
3.   Work in groups.

One of the ways for students to work in groups is the opportunity for them to present the case they have chosen together with a colleague of their choice. However, one of the characteristics of the television industries is that creating products is on a project bases where you do not always have the opportunity to choose the people you work with. During their last year of study, students learn disciplines related to creative industries other than the television one. That is why at the very end of the course, it is possible to group the students randomly in teams of 5 to 10 students. Each team has to

identify the inter-industrial connections of the television industry with one of the following industries: music, film, publishing, telecommunications, software. Which team will present which connections is also determined randomly? The teams present their findings during the last class activity.

## 4. Conclusion

An important stimulus for students in the discipline's learning process is the teacher's constant monitoring of students' participation, presentation and progress. Students know that, in addition to the result of the theoretical exam, their presentation in the practical part of the course is important in forming their final grade, and with excellent systematic performance they are able to be exempt from the exam. For those who are looking for a career as an intellectual property specialist in the television industry, a good performance in this course is very important, and this, as well as a recommendation from their lecturer, serves as a good reference when applying for a job in the sector.

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# The Creativity of Tourism Undergraduates as Future Creative Tourism Experts

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## Abstract

*It is widely acknowledged that creativity does not only manifest itself as artistic inclination, but is equally essential and reflected in any other fields and activities of life. Over the last decade it has basically become a trend leading to the boom of creative economy and industries, including creative tourism that emerged from the increasing demand for spending time creatively during the holiday, i.e., by taking part in creative activities. Creativity is our innate ability, however, if neglected, over the time and under the pressure of certain circumstances, it may decline; therefore, its regular nurturing is as important as the development of any other skill. Due to rapid technological and social advancement and changes, leading companies worldwide have already been screening their future employees' creative competencies within the recruitment process. Undoubtedly, tourism, as a constantly and rapidly evolving industry, cannot exist without creative professionals either. A creative workforce in any of its sectors is also highly justified in terms of sustainability and competitiveness. Hence, it seems that for Slovakia with its huge potential for the development of creative tourism, creative human resources are even one of the key factors of reducing regional disparities. But are tourism undergraduates as future creative tourism experts creative enough to address this challenge? The present paper shares results of a brief opinion survey conducted among teachers of the Department of Tourism at Constantine the Philosopher University in Nitra, in Slovakia. The investigation aimed at mapping their views based on their teaching experience on tourism undergraduates' and professionals' creativity, the importance of creativity for the tourism professionals, as well as the areas that require creative approaches in tourism. The findings of the survey, which revealed that teachers consider their students to be rather average in terms of creativity, are to be compared with the results of a further examination focused on measuring tourism students' level of creativity. In addition, these results serve as a basis for the research on testing and developing educational methods for supporting and enhancing creativity as a fundamental skill of future tourism professionals.*

*Keywords: tourism, higher education, creativity, creative tourism, opinion survey*

## 1. Introduction

Creativity can be approached from several perspectives. The present research is concerned with creativity as people's ability to come up with new and useful ideas and solutions. According to Teodorescu [8], the economic impact of creativity and innovation in tourism is significant: integrating creativity in production, selling and promotion activities may increase the added value of a tourism product as well as the final consumers' satisfaction. Hence, creativity is highly necessary for the tourism industry where traditional solutions may no longer necessarily result in the expected outcomes.

What is more, it seems that in terms of the COVID-19 pandemic, creative and innovative solutions are a must for tourism companies if they want to survive.

However, even starting a business is no more only a matter of funding; the innovativeness of the offered product is also equally important. This trend can be well illustrated by the incredibly vibrant scene full of start-ups yearning to capture a slice of the travel industry pie mainly through digital innovations, especially in travel management, e-tourism solutions or the field of accommodation, catering and gastronomy [2]. The growing number of innovative start-ups in the tourism industry is also enhanced by support programmes and initiatives worldwide, such as the *UNWTO Tourism Start-up Competition* which received proposals from almost 5,000 start-ups in the first two rounds [4].

The increasing demand for creativity has also led to the emergence of *creative tourism*, a new generation of tourism, which can be understood as the "co-creation" of the tourist product both by the tourists themselves and the local inhabitants [1]. Visitors are given the opportunity to use their creative potential by actively participating in activities that reflect the cultural specifics of the holiday destination [6]. As Richards puts it [5] integrating creative content into tourism experiences can reach new target groups, improve the image and competitiveness of the destination, as well as support the growth of creative industries and creative exports. A plethora of creative tourism products is offered worldwide, including experiences such as "Tapas" workshop in Barcelona or Amulet Making in Thailand [1]. However, the list of creative activities offered for the visitors of Slovakia is rather limited [3]. This fact contradicts the great potential of this country with rich cultural traditions and spectacular natural conditions for developing creative tourism. [7] Undoubtedly, one of the ways how to tackle the unsatisfactory offer of creative tourism products in Slovakia's regions is to prepare current tourism undergraduates as future creative tourism experts to address this challenge.

## 2. Teachers' Opinions on Tourism Students' Creativity

The analogies presented above led to the formulation of the main goals of the prepared pedagogical research. The preliminary stage in creating the strategy for creativity development contained a brief opinion survey among the teachers as tourism experts whose role can be described as a highly important part of the teaching-learning cycle since their work can greatly foster students' skills – including creativity. Therefore, *the main objective of the research was to explore the opinion of the teachers employed at the Department of Tourism at Constantine the Philosopher University in Nitra, in Slovakia on tourism students' and professionals' creativity*. In addition, the questionnaire survey also investigated the respondents' views on:

- the importance of creativity for future tourism experts;
- the fields of tourism that require creativity to a great extent.

Based on the given goals the online questionnaire contained eight questions; however, for the present study, only four of them were analysed. One of the selected items was formulated as an open-ended question, whilst the other three were developed as five-point Likert scale questions.

The research sample consisted of 11 respondents who had the relevant, several-year teaching experience through different courses related to the field of tourism and offered for a yearly average of 250 students.

The data were processed, with regard to the small sample and the character of the respondents' answers, mainly through applying the method of qualitative content analysis. The findings displayed in graphs and figures are described in the next part of the study.

## 2.1 The Results

The respondents' opinions about the creativity of tourism professionals based on their previous experience can be considered as considerably important since tourism teachers as "tourism expert customers" may have seen and explored the tourism market and tourism services in a different and more critic way than other customers do in general. Within the framework of the present research, neither the quality of the experience nor the sector of tourism in which it had been gained, was examined. The data were then compared to the respondents' views on the level of tourism undergraduates' creativity, as well as on the importance of creativity in tourism. Teachers could express their opinions on a five-point Likert-scale, whilst the highest value (Grade 5) reflected the highest and the lowest value (Grade 1) the lowest level of creativity or importance.
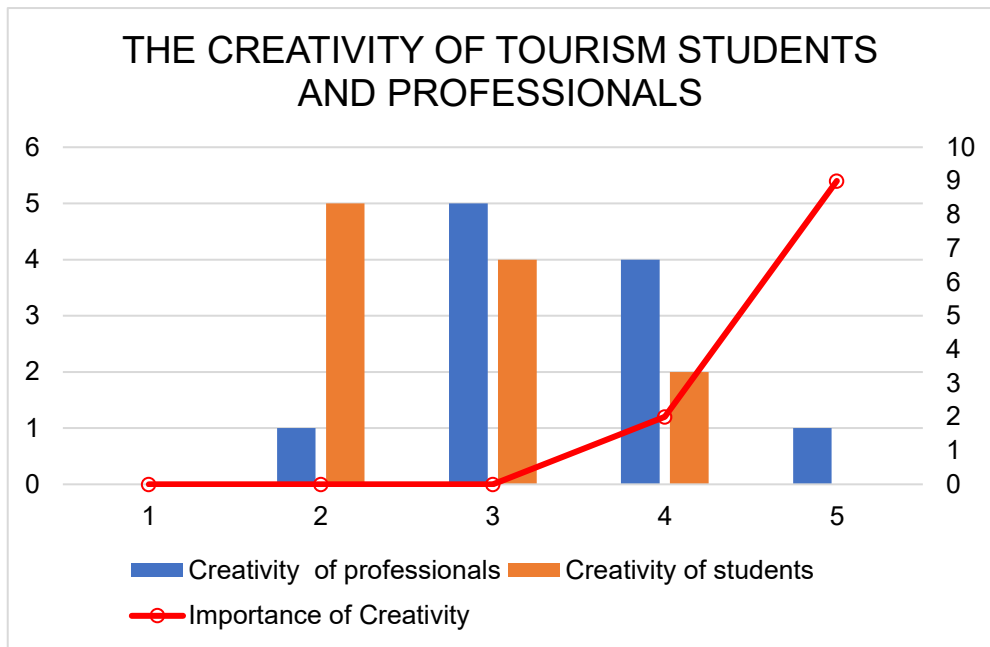


*Graph 1. The creativity of tourism students and professionals compared with the importance of creativity*

As it is shown in Graph N. 1, tourism professionals' creativity received higher ratings than tourism students' creativity, since nine out of eleven teachers considered students to be average (Grade 3) or even below average (Grade 2) in terms of creativity; only two of them indicated that they are quite creative and none of them perceived students as very creative. On the other hand, five teachers thought that tourism professionals were rather creative (Grade 4) or very creative (Grade 5), according to five of them, they were average (Grade 3) and only one teacher considered them to be below average (Grade 2). However, it can also be noticed, that teachers agreed almost unanimously, that none of the examined groups, (i.e., tourism undergraduates and professionals) is very creative since tourism professionals received the highest rating (Grade 5) only in one case. Yet, the respondents' agreement on the importance of creativity is indisputable since nine out of eleven respondents assigned the highest value (Grade 5) to the importance of creativity and the other two of them indicated Grade 4.

The next item of the questionnaire, which had been formulated as an open-ended

question, investigated the activities and fields of tourism that according to the respondents require creativity to a great extent. Each respondent could give multiple answers which were then divided into several groups.

*Fig. 1. The fields of tourism that require creativity to a great extent*
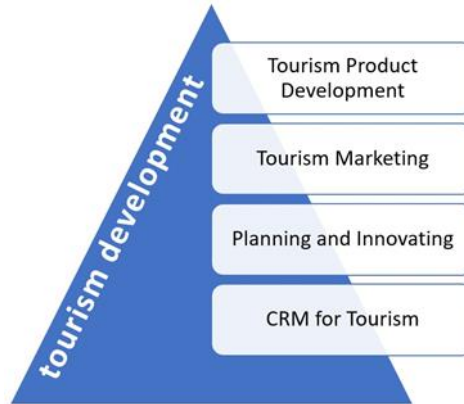


It can be seen in Figure N.1 that the fields and activities of tourism, in which creativity is a must, according to all the respondents, are primarily related to *Tourism Product Development* (mentioned eleven times). *Tourism Marketing,* including mainly the activities connected to promotion and advertising, was identified less frequently (three times). Similarly, *Planning and Innovation* including various planning and strategic responsibilities, project management, training, etc., were identified by three teachers.

Finally, *Customer Relationship Management* (CRM) also appeared among the answers (two times); it means, that according to the teachers, the activities related to this field may require creativity to a smaller extent in comparison with those mentioned above.

## 3. Conclusions

In light of the above-presented results, several conclusions can be drawn. Firstly, the apparent difference between the tourism undergraduates' and tourism professionals' creativity may be explained by the fact that the latter group has been exposed to everyday real-life situations that often require creative solutions, and, thus, their creativity have continuously been fostered. However, the fact that none of the examined groups was identified as very creative, indicates the necessity of developing creativity for both of them. Besides, creative approaches and fostering creative competencies seems to be the most relevant in terms of courses/people working in fields, as follows: Tourism Product Development, Tourism Marketing, Planning and Innovation, as well as Customer Relationship Management.

## 4. Limitations and Implications for Further Research

The limitations of the study can be described in terms of the small research sample, even though the findings clearly imply the importance and the need for nurturing both tourism professionals and tourism undergraduates' creativity. Since the present research is the preliminary stage of further investigation, solid conclusions will be drawn after the comparison with the results of measuring tourism students' level of creativity. These

findings will then create a platform upon which the investigation on testing and developing creativity-enhancing teaching methods will be built.

Implications for further research arise from the clear difference between the tourism undergraduates' and tourism professionals' creativity. Among other things the length of the professionals' work experience may be quite relevant to explore; in addition, the participation in various training activities could also be worth examining.

### Acknowledgement

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# The Necessity of Learning Litigation Procedure in the High School

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## Abstract

*The learning procedure keeps the graph with the developing line, starting with the evolution of the person from childhood to adolescence. Learning and development are different understandings in the English language; however, the aim of both word definitions takes us to the same result. Nevertheless, learning is an ability that comes from birth. However, development is a continuous step of the learning procedure and characterized as a skill. Taking into consideration that humankind adores developing under control of third parties, then analyses should take its root from the beginning of learning procedure and development, namely schools. Under most civil law countries legislation, the state has an essential duty to establish a healthy atmosphere for children to gain essential skills in various subjects at schools. Nevertheless, if we change the sphere from technical subjects to more classified one, moreover to load the legal skills to children on the frame of understanding general legal education, litigation procedure and representation, which outcomes will we meet? The authors intend to handle the first important parts of litigation procedure which can be taught at schools, to be more exact on the matter, the touched points are about finding proper definition and simplification of civil litigation procedure as training material for school listeners since basics of civil law are hidden at every subject that is taught at school. The abstract is based on research and in-depth analyses of overall school children's capacity of learning; however, bearing in mind that it could be tough for them to comprehend whole training at first glance.*

*Keywords: litigation procedure, steps of litigation, civil law*

The moral of the definition of the phrase "teaching" contains such valuable and sacred labor in it since starting from the golden era of philosophy from Greece to the millennium century of technologies, educators play a huge role with their view of modernization of education sphere and the effect of that approach to the modernization process. While analysing the times before common era (b.c.e), and the times of millennium which ended the robotization of daily life, it is a clear fact that everything takes the roots on the way of development from bright initiatives of educators that make sense on the procedure of changing the flow of time. It is evident from the statement; every crucial discovery includes the theory of aiming initiative (Dudin M.N., Shakhov O.F., Shakhova M.S., Rusakova E.P., Sizova Y.S. (2019)). As an example, it is enough to look at the lifetime of the great son of the Republic of Azerbaijan, namely Lutfi Alaskarzadeh (Zade), who invented the theory of fuzzy logic and today the most prominent companies (Toyota, Honda) use his theory while designing new mechanisms. Mr. Zade dedicated his whole lived and died as an educator, and it is not a surprising fact that he is the only person in the world that keeps his honorary status of a scientist at Honda University after his death.

The above example is not coincidence or promotion of the famous scientist, yet the theory is like a foundation of construction, and it decides the future of the building, or

otherwise, the construction will be finalized or demolished in the middle.

The theories that have been discovered by well-known educators have an exact impact on modern teaching and research activities, and authors handle the theoretical stance of modern jurisprudence. Taking into account that the balance of the world is not stopping to change in the face of legal instruments and international law methods, jurisprudence should demolish stereotypes and its serious cover as well. As everything has a logic start button, it has also to contain the steps of way within the appropriate learning plan. Planning is one of the impartialities in the first stage because the suggesting training course includes the 10-11 (12) grade students whom the authors believe that has a mental capacity for learning and comprehension. (Dudin M.N., Bezbakh V.V., Frolova E.E., Galkina M.V. (2018)).

They are starting with the necessity of suggesting a training plan for clarifying and opening the scene for understanding. First of all, it is an accepted fact that lawyers have been accounted as the most elite category of the society from the early shaping of humanity and humankind since every single document had to be written by professional lawyers to show the person's interest on the paper clearly and correctly. Today, nothing has changed, and today, being a lawyer is an excellent plus from the perspective of finding an important place in society. However, authors intend to discuss possibilities of preparing future lawyers or enshrining the simplified legal education, besides the basics of civil litigation procedure. It can be seemed quite harsh for school learners, but what is the reason for educating the anatomy as a part of biology but putting aside the legal and litigation education. The authors discuss the fact that it is quite a discriminative factor for the students who are aiming to be future lawyers or enlighten the basic principles of litigation.

The second pivotal factor is dedicated to the people who are going to educate them.

At first glance, the version of professional lawyers comes to mind. However, the authors suggest the main principles of TOT (training for trainers) programs since the addition or mixture of an education program can be ended with a fiasco. Here the suggested program does not require the inclusion of professional-level lawyers to education. Instead, educators (here school teachers), especially the teachers of history, should be trained by professional lawyers on the basic principles of civil litigation in order to add students to the stipulated program.

While going deeper to analyse the inclusion of the civil litigation procedure to the school syllabus, it is more important to discuss the main two questions: "Which" and "How". Initially, the first discussed and considered question is "which", that more involves the formation of training modules during the classes, and the second, the question "how" contains the follow-up answer of the first Q&A part, and finds the implementation ways.

For finding the answer to the question "which", we have to handle the basic principles of the civil litigation procedure because it will help the students on their path along with the litigation procedure before becoming a professional barrister. That is why the first element that should be clarified is the phrase "claim". The claim is easily simplified as following for clarifying the introduction and avoiding the massive legal dictionary: "To demand and assert as a right" or "something that one party owes to another". As continuous the first introductory definition, it is better to understand the legal nature of the claim. In general understanding and practice, the claim should be prepared in written form in order to start the litigation procedure.

Here, the question on the writing or preparation of the claim and content of the document can occur. Visual from the naming of a legal document, the claim should be submitted so far that the person who initiates the document is accounted as the claimant.

It makes clear that two legal phrases automatically be named a claim and claimant.

Students can prepare the content of the claim under the control of well-educated

teachers since it is quite simple after in-depth analyses, considering that the claim contains the request or restoration of violated civil rights by claiming the party from court excellencies. Depending on dispute, the content of the claim should be simplified for school students as following (Gene. R. Shreve, 1977):

- the court where litigation will be heard
- parties who are the litigation parties
- a full explanation of the reason for the litigation and claim, e.g., requests from the court
- the subject of the claim which the claimant requests from the respondent in the material form.
- factual reason – is the second part of the explanation, namely "reason", that the claimant explains the reason for suing the respondent. (Rusakova E.P., Frolova E.E., Kleandrov M.I., Kupchina E.V., 2019).

In the final part, it is mandatory to take legal consultation from an operational, professional barrister since the claim should refer to the articles of civil law which figure out the compliance of violation of rights regarding legislation.

Another eye-catching and jaw-dropping way of dispute resolution is making a pre-trial claim. Since more or less, either legal parties or physical parties are afraid of the defile of their reputation. That is the reason that pre-trial claims have more effect rather than claims on the way of resolution of civil litigations. The pre-trial claims contain the same content as claims except for the reference of litigation to the legislation part, so it can be good practice for students in order to comprehend the procedure. (Robert. M. Bastress (2003)).

The suggested module of training might be applied to the pilot groups in order to take the fruitful results, and the authors highly believe that it will have a significant impact on the students; the offered module will grab only the positive reactions. Moving to the conclusion of civil litigation in high schools the civil litigation highly depends on the procedural matters, yet they are playing huge roles in decision-making procedures by judges. Considering the fact of procedural matters, the authors suggest the moot civil litigation procedures after all finalized chapters, and it will affect students on the procedure of comprehension of the civil litigation procedure. At this stage, there is a factor that can be characterized as keyword: excursion. The excursions to the real open litigation procedures can be locomotive motivation for the students, and gained knowledge can be applied to the moot litigation procedures at school. Professional advocates of judges can design the operational part of moot civil litigation. Here there is a social event that can appear: "relation between civil litigation courts and high schools".

From the first perspective, it can be comprehended a bit tough for school students, but we cannot avoid the factor that every person has to know his or her right. Notably, the international arena is more alarmed in the rights of the child. Moreover, the United Nations organization gives more chances for children to voice their wishes and problems today compared with the times of the Cold War or the start of the millennium. The child advocates Malala Yousafzai and Greta Thunberg made great debuts under the UN's bright lamps while drawing attention to main classical topics: environmental change and ignorance.

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# The Online Campus. Higher Education Institutions in Time of Pandemics

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## Abstract

*Higher education systems do not adapt quickly to changes and lack flexibility, so individual and social demands for higher education remain with a fairly significant number of requests and individuals seek elsewhere for solutions. Universities are the key players in the future of Europe. For the successful transition to a knowledge and society-based economy, in this crucial times, a thorough restructuring and modernization is required. Over the last decade, the advancement of new technologies has allowed users to meet their own learning and communication needs both with colleagues and teachers, within their own communities or within external communities. However, online delivery of high-quality video tutorials or classes was never a must or a priority. Once the Coronavirus crisis stroke the entire learning environment was "forced" to migrate online, therefore online learning switched from a preferred or sometimes available option to a new normality. More than three hundred million students around the world did encounter disruptions in their education process caused by the spread of Coronavirus. Educational institutions have not confronted such severe disruption in decades, but unlike any past occurrences, now there is the ability to continue the education with the doors closed. Taking into account that learning by using new information and technology sources has been around for a long period of time, it is remarkable how the impact of technology did not have a substantial influence on education until now. Digitalization in education was meant to happen gradually, but COVID-19 made it an accelerated process with large scale adoption of educational technologies and a boom of delivering courses online. In this paper I perform an analysis through a prospective study on digital challenges in higher education institutions during the latest pandemics. The importance of the analysed subject is derived from the situation in which universities ended up, during these hard times. Also, the analysis of this subject reveals several factors, besides the digital infrastructure, that are very important in the online delivery of education, and namely: adapted course outline and design; tutor/trainer/professors' skills set for delivering the course in "special" conditions; tracking the understanding; motivating the involvement and compensating for the missing human side.*

*Keywords: Higher education, pandemics, online teaching and learning, digitalization*

## 1. Introduction

The "campus disruption" caused lately by the by COVID-19 pandemic forced the universities around the world to focus on remote education. Institutions are now planning for the forthcoming 2020-2021 academic year by updating the resources and considering the strategic transformation of the course's delivery. The pandemic has constrained colleges to bring their courses online, but this is only one stage along the way to another educational process, in any case. We can anticipate that emergency of a new model as

soon as the pandemics passes. While each education level is confronting its difficulties, it is the higher education that may wind up a learning upheaval. Universities distinguish themselves by the fact that their students are both mature enough to deal with the online learning requirements and tech-savvy to explore new ways of learning. The challenge is harsher for the traditional and campus-oriented universities, because their ability to adjust by picking the correct technological advancements and approaches for teaching and connecting with their understudies might be limited.

## 2. Online Courses – the New Normality

At the present time, video-conferencing applications like Zoom and Webex are tossing colleges a survival way-out. Whereas, professors are attempting to keep up a similar commitment with the students as if they could have in a traditional setting, they have to discover solutions to stay away from a sink in the instructions quality that they are giving. The interest of the students for online deliverables will probably increase as a result of COVID-19. Indeed, even before the pandemic, numerous colleges were seeing decreases in enrolment for traditional programs and equal increased demand for online courses. With COVID-19, we are perceiving how yesterday's disruptors can turn out to be the present lifeguards. While conventional education institutions once saw online teaching and learning as a danger, it has now rescued the system. The adoption of online learning solutions lately has been a really unprecedented action. In a very short period of time, lecturers are applying so called "first aid" arrangement by exchanging totally from face to face to remote guidance, a move that has been constrained upon them by unexpected obligatory closure of the campuses. In any case, they are rapidly understanding that remote learning is only a small step a in the long way to offering online learning. In good part in all this is that the associations started between colleges, online instruction organizations and tech suppliers may proceed also after the pandemics.

### *2.1 Adapted Course Outline and Design. Tracking Students' Performance and Involvement*

Universities have in important decision to make regarding the delivery of the courses in the new conditions and one of the first questions that arises is: Which the remote delivery methodology is used by the academic stuff? They have several options in this regard: synchronous type (online, real-time meetings), asynchronous type (courses prepared in advance) or mix the two methodologies (blended) [1]. Online courses are different from correspondence courses. Rather than focusing on packaging and delivering content, it is better to focus on the interactions between professors and students, between students and other students, and between course content and students. The courses should be as attractive as possible, organized, easy to follow and should not create confusion. Having a large number of technological resources at disposal, the chosen IT source should be of best fit [2]. The goal should always be teaching-related resources to add value or promote student learning. Misuse of resources can quickly overwhelm students, limit student participation and reduce learning interest. Therefore, technologies should help understand the content and avoid duplication. In such a tight time, a clear communication with students is essential.

Expectations should be set in order to be as clear as possible, also establishing clear and consistent policies should be a target. Regarding work instructions, students should focus on tasks instead of struggling to complete them. Due to the lack of face-to-face interaction, feedback is crucial so keeping in touch with students and providing personal and class feedback is a must. Given the fact that time of attention is very short, especially

when the students are not in the classroom the best solution could be packing course content into "blocks" and switching between these blocks every few minutes to change course content. Content blocks of five to seven minutes are ideal, blocks longer than 15 minutes are discouraging. Pre-made third-party materials like chapters of books, websites, tutorials, online simulations, and articles should be. prepared for splitting the lectures [3]. As fully online teaching methods continue, certain teaching methods should gain wide attention. Universities may compete for students based on the degree to which they implement these teaching methods and their prominence. If the pandemic continues to be uneven and fluctuates for a long time, we may be used to alternating between in-class teaching and fully online teaching [4]. These challenges of the online in higher education might be a new way of doing things that opens up new opportunities. This is an open door for academic staff to figure out how online means that are utilized to conduct online courses can supplement up the traditional learning methods.

Online courses register higher dropout rates compared to similar face-to-face ones; therefore, motivation is a crucial factor when it comes to online learning. Feelings of isolation, frustrations and time constraints are factors that influence the decisions of the students to withdraw from online classes. Most researchers have identified four key parts that are critical to the development of students' motivation in online classes or distance learning: First of all, it is autonomy – having control over what and how it should be done, second comes – ability – feeling that one has the ability to succeed. The third element is relatedness – carrying out the required tasks that will help students establish more connections with the learning environment and last but not least – relevance – students must perceive their tasks as interesting, useful and valuable for their plans/goals.

Tracking the students' activity in the online learning may help identify some patterns, understand their working habits and interfere with guidance when necessary [5].

### 2.2 Instructors' Skills Set for Online Courses Delivery

Teaching online courses is not just a replica of classroom strategies in other forms. It is a process that requires a diversified approach, one that pays less attention to the time students spend together in a specific place, and focuses more on promoting remote communities and activities that target students working alone. There are studies that assessed the online teaching instructor readiness, which mentioned a reliable set of skills very important in this context: 1) technological, 2) pedagogical and 3) administrative [6].Technological and even social media skills are a fundamental element that are enhancing the abilities of the academic stuff to interact with students. Administrative part is including skills such as time management and the ability and willingness to answer student questions as soon as possible, for example within 24 hours. It means providing timely and constructive feedback to students, to be proficient and monitor/follow academic integrity problem. Pedagogical/teaching skills refer to student-centered models, professors that emphasize support and guide through learning and not just the delivery and instructions and the ability to establish the online presence and involvement.

Beside the three skills already described, other sources mention also: communication skills, assessment and evaluation skills [7]. Instructors with experience in face-to-face teaching methods might need to develop stronger written communication skills. Another important aspect is the accurate assessment of students' performance, professors need to monitor class access, discussion posts, class activity. In a digital education environment, there are new ways to identify learning difficulties and other factors that affect academic performance. Professors ought to assess what works and what doesn't as they conduct the courses remotely, and they shouldn't avoid consolidating the experience gained through these times into future in-person guidance. They should not dispose of what they make but use it as a chance to retool and patch up how they

instruct. Traditional classroom teachers have reached high-quality education by relying on a large number of resources, and expecting strong leadership to improve classroom results. Digital classroom teaching demands the same foundation as well as support systems to create an engaging, productive environment that leads to optimal learning.

Technical resources do not relieve online teachers of the responsibility to acquire advanced skills through professional development. The emerging technology-dependent online learning environment will require educators to strengthen existing skills and adopt new ones.

### 2.3 Compensating for the Missing Human Side

Keeping the human element in the online teaching it is a very important and perhaps challenging thing to do. Although online teaching will definitely change the way teachers communicate with students, the professor-student relationship is equally important for students to learn and participate in online courses and offline courses. So, what makes the online experience less like robot-teaching and more human-centered? The following three principles and related strategies will help teachers maintain the humans' position of people's online courses. First is it about "presence", even if teaching of student-centered online courses is a lot of work and instructors might spend a lot of time setting up the content of the courses, these behind-the-scenes behaviours cannot convey to students the feeling of who is behind the scene. A recent study conducted by researchers at George Mason University and Brigham Young University has shown that lecturer video feedback makes students feel more connected, involved and more responsible for their own learning [8]. Secondly, it is also about empathy. When using asynchronous communication tools, empathy may be more difficult to show, but of course it is possible.

Third element is awareness, which in this context means being aware of the students' needs and dedicating some time to support and encourage them whenever is necessary.

Even in an environment where there are no face-to-face meetings a sense of community and personal connection with students can be established. Online courses are even prone to create greater connection between academic stuff and their students than traditional ones, but this might happen only by using the right techniques and methods.

## 3. Next Steps – Managing the Challenges

At the level of higher education institutions, leaders have sought for different ways to resolve the COVID-19 crisis. However, most of them did not look up for solutions outside their organization [9]. They were swallowed by local focus, ignoring what was happening outside. Universities need to establish a control center that would help higher education leaders plan and manage their response to COVID-19 or similar pandemics by setting up work teams with specific responsibility areas [10]. This kind of work-plans should be split into four parts.

1. Find an accurate view of the situation in campuses, virtual classrooms, and the wider community, and draw a meaning from that.
2. After quickly testing hypotheses and alternative methods and ensuring that the values of the university and local community are followed, decide what actions to take.
3. Design a combination of short-term and long-term actions with a pragmatic operating model to develop detailed action plans.
4. Provide effective and flexible planning and responses. The control center must have regular meeting and strengthen the sense of responsibility by tracking the operations, timing and responsible.

Universities should consider whether and how to make changes to the current teaching model for making it more scalable, flexible, accessible, and more attractive.

Further on very important aspects to address are ensuring that students receive all the necessary assistance and maintaining educational standards.

## 4. Conclusion

There is little uncertainty that higher education – in each sector – is now confronting an immense blend of pressure to change. The call for higher education institutions to expand their utilization of online environment for learning and to turn out to be "progressively flexible" is a piece of this specific situation, despite the fact that the meaning of these thoughts in operational terms it is not yet clear. I have mentioned that universities have few choices but to confront the ground-breaking pressures for educational change, but it ought to do this in a planned an informed manner. This will be especially valid by a fast scale-up in the utilization of internet learning, different uses of information technologies and the call for more adaptability, flexibility and responsiveness in the structure, deliver and conveyance of the programs and courses.

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# The University Course "Protection of Intellectual Rights" in the Training of a Corporate Lawyer

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## Abstract

*We are surrounded and continuously interact with intellectual property. The legal regulation of intellectual property is designed to facilitate the process of effective management of innovation processes. The essence of the legislation in the field of patent and copyright law allows innovative-active enterprises to provide competitive advantages, improve the innovation climate, create conditions for the widespread use of innovative results, and obtain appropriate profit from the sale of products. A corporate lawyer is not just a legal adviser; it is a member of the management team and a full member of the enterprise strategy development. The primary task of the lawyer in this area is to help develop the business, to ensure that it is within the framework of the law, it works efficiently and makes a profit. The accelerating development of information technology has a significant impact on the use, protection, and protection of intellectual property. The emergence of social networks, the growing number of mobile devices and applications, the ever-increasing bandwidth of information channels, and the changing behaviour of consumers force copyright holders to revise their strategies and models for the distribution, commercialization, and control of the intellectual property in the electronic environment. Undoubtedly, these processes necessitate the training of highly qualified personnel in the field of corporate law. Intellectual property law is the youngest and most dynamically developing legal institution. The course "Protection of Intellectual Rights" is to be studied in a Master's program based on previously acquired legal knowledge in the field of civil law and other related areas of law. One of the main goals of this course is the in-depth professional training of students, the formation of a holistic and systematic understanding of how to protect intellectual rights, the development of skills for independent analysis of legal situations and the adoption of legally competent decisions on disputes related to the protection of intellectual rights.*

*Keywords: intellectual property protection, corporate lawyer, educational process, master's program*

## 1. Introduction

In organizing and conducting business, the role of a corporate lawyer is one of the essential. Most companies around the world are organized according to the corporate type, which necessitates the training of highly qualified personnel in this field. The digital revolution and the widespread introduction of new technologies contribute to the active development of economic ties and trade at the global level [2]. The importance of intellectual property in market relations significantly increases, causing additional competition. In recent years, the phenomenon of the commercialization of intellectual property has become widespread. It represents the process of involving intellectual

property in economic circulation, the use of intellectual property in the economic activities of enterprises [5]. The main functions of corporate lawyers have also changed in recent years, and it was not a conflict resolution that came to the fore, but the creation of conditions to prevent the emergence and development of controversial situations. In order to be in demand on the labor market and effective in the workplace, a corporate lawyer must understand the field of law and the fundamental business processes [4].

Such high requirements for specialists in this field pose a challenge to modern teachers of higher educational institutions when teaching students in master's programs.

Most universities that train lawyers do not focus on corporate law and provide only superficial theoretical knowledge without any practical work. The unique course "Protection of Intellectual Rights", which is to be studied in the master's program of the Peoples' Friendship University of Russia (RUDN), on the contrary, aims at teaching the practical aspects of the lawyer in the company and revealing the main areas of activity based on professional standards and the requirements of employers. This training program is designed to teach the company comprehensive legal support, which requires relevant knowledge not only in the field of corporate law but also in the protection of intellectual property rights.

Traditionally, universities and academic institutions are the source of the knowledge that underlies new technological processes. It is this knowledge that can ensure competitiveness among graduates of the legal profession.

In the current conditions of a market economy, the role of the unique course "Protection of Intellectual Rights" is determined by its ability not only to satisfy the public need for training and retraining of specialists in master's program but also the ability to compete in legal protection of intellectual property that meets the requirements of the Russian and world markets.

## 2. The Main Methodological Approaches to Training

Intellectual rights, under the features determined by the intangible nature of their objects, require a unique system of protective measures, and the very existence of such rights depends on their effectiveness. The protection system also ensures intellectual property subjects' interests protected by law, including those that exist outside of subjective law [3].

A two-stage education system (bachelor's and master's degrees) allows for powerful theoretical training of students in bachelor's degree, but the task of the master's program is to provide maximum practical consolidation of previously acquired knowledge.

Within the framework of the unique course "Protection of Intellectual Rights", the master's program students are required to study a comprehensive range of issues, such as general characteristics of intellectual rights, protection of intellectual rights in civil, administrative and criminal proceedings, protection of rights to domain names, protection of intellectual rights by customs authorities, issues of legal and economic assessment (IP Due Diligence), the grounds and methods of challenging intellectual rights, and alike.

The primary external consumers of the services of higher education institutions are employers (enterprises, organizations, public authorities, and alike) who hire university graduates and expect them to possess a set of professional competencies that meet the requirements of developing an innovative model of the economy and society.

In recent years, an educational trend has been established in the system of higher vocational education in Russia, within the framework of which the quality of modern education as a result of the provision of educational services is determined by the degree to which professional graduates are formed, that is, the ability to identify links between knowledge and cases and apply the acquired knowledge to solve professional issues

adequately.

As a result of the development of the course "Protection of Intellectual Rights", students form the following knowledge, and skills:

- knowledge of the main types and characteristics of intellectual property;
- knowledge of the primary means and methods of protecting intellectual property rights;
- the ability to apply legal norms governing the relevant legal relations to find and be guided in judicial and arbitration practice;
- ability to analyse various legal phenomena, legal facts, legal norms and legal relations that are objects of professional activity;
- knowledge of legal terminology, skills in working with legal acts;
- skills in analysing law enforcement practice and resolving legal problems and conflicts.

Many modern employers note a low level of student involvement in the educational process. According to their estimates, less than half of the students are interested in acquiring practical skills during the internship. In this regard, the tendency to strengthen the practical bias of master's programs is observed everywhere. The unique course "Protection of Intellectual Rights" is no exception to this.

In order to increase the level of students' preparation, the program is structured in such a way that the student, within the framework of lecture blocks, receives only input data on the discipline. The main volume of classes is held in the form of practical classes, which discuss the latest trends in the protection of intellectual property rights and analyse cases and specific court decisions. This approach to training makes it possible to apply specific provisions of the law in practice. Modern technologies and educational standards determine the transition from classical lectures to innovative ways of transferring knowledge – video materials and Internet technologies [6].

The program of the course "Protection of Intellectual Rights" also includes interactive forms of training, and is provided by electronic educational resources and is accompanied by a specialized scientific and innovative infrastructure. New educational technologies also influence the development of the educational program.

As part of an innovative approach and the use of modern educational technologies, the Peoples' Friendship University of Russia has developed the Telecommunication Educational Information System (TUIS in Russian). This resource, created based on the open-source MOODLE software, includes electronic informational, educational resources, a combination of information and telecommunication technologies that provide support for the educational process and facilitate students' autonomous work, allowing them to master the tutorial regardless of the student's location. The electronic training course "Protection of Intellectual Rights", created as part of the TUIS, includes all the necessary theoretical and practical tasks and allows us to control the level of students' learning of material from anywhere in the world where there is access to the Internet. When implementing training using the TUIS platform, the students' independent work is activated: the opportunities for providing quality education to all categories of students are expanded, regardless of their residence, state of health, social status, and age.

## 3. The Main Results of Mastering the Course

Transferring the training courses into digital format allows solving many problems caused by the current state of the higher education system as a whole [1]. The ever-increasing rate of competition among higher education institutions is creating innovative

approaches and developing new strategies in the higher education system. Moreover, the epidemiological situation developed in early 2020 connected with the spread of a new coronavirus infection served as the reason for the transition of the entire education system to a distance-learning format. In this regard, the electronic training course "Protection of Intellectual Rights" acquires even greater practical significance when teaching students in the master's program. When implementing training using the electronic educational environment, these crucial tasks are solved:

- there is an increase in the quality of education through the introduction of modern forms and means of instruction through the Internet;
- the activity and responsibility of teachers and students increases;
- the availability of educational courses, including for persons with disabilities increases;
- there is the possibility of using blended learning technologies;
- the opportunity to study at any convenient time for students is provided.

Undoubtedly, on the one hand, when using information technologies in the educational process, the load on students increases. It is because such a training format is more personalized and allows teachers to approach the verification of students' autonomous work more closely. On the other hand, this approach allows the training of highly qualified specialists.

## 4. Conclusion

Most scholars around the world agree that modern higher education will no longer be the same. Social distance and the widespread transition to electronic educational technologies is a powerful impetus for introducing new standards and training programs.

Of course, the ongoing changes in the social and educational environment will entail changes in the labor market. In this regard, the role of highly qualified specialists in the field of corporate law and intellectual property rights protection will increase significantly.

### Acknowledgments

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# Usage of Mathematical Models for Cybersecurity Analysis

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## Abstract

*In the early 1990s, the word "hacker" was used to describe a very good programmer who could construct complex logic. Unfortunately, over time, the word "hacker" has acquired a negative meaning vastly due to the media. A hacker is described as someone who discovers new ways of "hacking" into a system, be it in a computer system, a programmable logic controller, someone who is able to break into banking systems, steal credit card information, and more. This is the general picture of a hacker built by the media, but it is not completely true because everything has a positive and a negative side. Network attacks are usually defined as intrusions into the network infrastructure, achieved by analysing the network, gathering information about existing open ports or vulnerabilities and in some cases unauthorized access to resources. Computer security training is very important in today's dynamic world. In this report, we will briefly present the mathematical methods and approaches we use in teaching our students in the field of computer security. We will present several mathematical principles for network attack analysis. We will mainly use Game Theory of the Nash equilibrium. It will describe mathematical models of linear optimization and how they can predict or prevent a future attack. We will analyse penetration through random processes with discrete time. We will use examples of game theory and operations research that will be adapted to cyber-attacks. Training in computer security and protection against hacker attacks is very important at the University of Library Science and Information Technology and South-West University "Neofit Rilski". In this report we will describe practical ways to implement our training and the results we achieve.*

*Keywords: game theory, mathematical models*

## 1. Introduction

Chess is a two-person game where each player has a strategy. The purpose of chess is to put the other player in a position where their king will be captured no matter what move they make. That would be a profit for the player. Poker is also a game where players bet money based on their cards. The pay-out that a player receives with a winning hand is the money in the bet. The loser in the game of poker also has a pay-out, but in their case, it is negative, that is a penalty. Players have strategies based on how good their cards are and how well they believe other players' cards are. Cards are hidden, which means that the player does not have all the information before making their bets.

Further, in poker, they may not be aware of the opponent's possible choices, may

they be bluffing or willing to respond to our bluff according to situations?

This is against chess where the player knows what moves the other player has made and where all his pieces are. Both chess and blackjack have common themes. Players used strategies by players and revenge. We can abstract these concepts to create the mathematical field of game theory. Game theory has been applied in many fields and is a useful way to quantify the results that may depend on the actions of multiple players or strategic agents. For example, we can model network defender and network attacker interactions as a game. Apparently, there are two players, the defender and the striker.

The defender has strategies for protecting the network, while the attacker has strategies for breaking the network. Paying for an attacker is digital assets (PI, data, secrets, intelligence, crypto currencies, bank account numbers, etc.) can steal a defender, on the other hand, the defender works to avoid the penalty of losing them.

Game theory is also applied in economics, as it is a way to model a competitive market. In social contracts, game theory can be used to consider people's cooperation against selfish actions. It can generally be used to model competitions that are present in different areas. This chapter covers the main games that are common in game theory analysis as well as game decisions. The solutions are the strategies used by the player to provide the best result or the highest pay-out [1-8].

Operations research, game theory and various mathematical methods and theories are combined. This discusses new scientific perspectives of an interdisciplinary nature that relate to several fields of research in pure and applied mathematical sciences. These contributions focus on new developments in mathematical sciences with an emphasis on the solvability of the cybersecurity problem. Modelling through game theory and operations research is a fairly common technique for cyberattack analysis. In this report we will present examples developed by prominent Russian scientists in the study of operations and game theory – Zaichenko, Krasnoproshin and Vetel. These examples will be used in the research work of the two PhD students Radoslav Stoev and Ilian Ivanov. These examples will be used for traffic analysis and network attack modelling [1-4].

## 2. Methodology

However, not every matrix game has a saddle.

The price of the game, equal to zero, has all symmetrical games, i.e., games with half-symmetric matrices $a_{ij} = -a_{ji}, i = 1,..,m; j = 1,..,n$

In symmetrical games, the optimal strategies of the opponents coincide and the cost of the game is zero [1-4].

Really, let's $x^*$ и $y^*$ are the optimal mixed strategies for both players.

For each $y \in Y$ we have: $v \leq E(x^*, y)$ we lay $x^* = y$ and considering that $a_{ij} = -a_{ji}$ we get $v \leq E(x^*, x^*) = 0$. Similarly, $v \geq E(y^*, y^*) = 0$

Therefore $v = 0$ и $x^* = y^*$.

If for a payment matrix game $A = (a_{ji})_{mxn}$, the price of the game is *V*, it is for a payment matrix game $A = (a_{ji} + w)_{mxn}, w = const$ the price of the game is $v + w$.

Really

$$E^{'}(x, y) = \sum_{i=1}^{m}\sum_{j=1}^{n}(a_{ij} + w)x_i y_j = \sum_{i=1}^{m}\sum_{j=1}^{n}a_{ij}x_i y_j + w\sum_{i=1}^{m}x_i \sum_{j=1}^{n}y_j = E(x, y) + w$$

$$E'(x^*, y^*) = \max_{x \in X} \min_{y \in y} E'(x, y) = \max_{x \in X} \min_{y \in y} E(x, y) + w = E(x^*, y^*) + w = v + w$$

A random process occurring in system S is called Markovski if it satisfies the property:

For every moment of time $t_0$, the likelihood of any system status in the future (at $t > t_0$) it depends only on the state and at the moment (at $t > t_0$) and it does not depend on when or how she found herself in this condition.

We will only consider systems S with finite number of states $S_1$, $S_2$, ……, $S_n$.

The state graph (of system S) geometrically depicts the possible states of the system and the possibilities of transition from one state to another (in one step).

<u>Example (Fig. 1):</u> S – an attacked computer that may be in one of the following states: $S_1$ – working, working; $S_2$ – defective, waiting for diagnosis; $S_3$ – diagnosed; $S_4$ – repair; $S_5$ – Fig. 1.
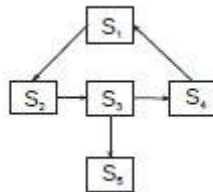


*Fig. 1. Attack server status graph*

Discrete-Time Process: Transitions of the system from one state to another are only possible at strictly defined, pre-fixed times $t_1$, $t_2$, … Process with continuous. time: transitions are possible at any random time t.

## 3. Result

We start by looking at a simple game and then use it to build the foundations of game theory [8-10]. The game is called the prisoner's dilemma. It is a two-player game that model's collaboration versus competition. There are applications in economics, politics, sociology, biology, psychology and political science, to name a few fields. Also called the game theory equivalent of an eye for an eye. The scenario of the game is that two people, Alice and Bob, have been charged with a serious crime. Unfortunately for the police, they only have evidence of less crime [12-14]. Alice and Bob are placed in separate rooms and are given two options. They can be silent or confess If they are silent, they will only be charged with a minor violation. If one is silent while the other confesses, he is silent on being charged with a serious crime while the other is going out for free. If they both admit it, they will both be convicted of a serious crime, but the prosecutor will demand a lighter sentence. Alice has two actions in the game. She may be silent or confessing. Bob has the same two actions and the outcome of the game depends on both Bob and Alice's actions. Bob's choice may affect his outcome and may also affect Alice's. The geometric method is applicable to games in which at least one player has only 2 strategies [1, 8, 11-14].

Case 2 x 2. Let a 2 x 2 matrix game have no saddle point:

| Player I | Player II | $y_1$ | $Y_2$ |
|---|---|---|---|
| $x_1$ | | $a_{11}$ | $a_{12}$ |
| $X_2 = 1 - x_1$ | | $a_{21}$ | $a_{22}$ |

The geometric method consists in constructing the lines $y_1$ and $y_2$ respectively on pairs of points $(0, a_{21})$, $(1, a_{11})$, and $(0, a_{22})$, $(1, a_{12})$. These two lines have the equations:

$y_1(x_1) = (a_{11} - a_{21}) x_1 + a_{21}$

$y_2(x_1) = (a_{12} - a_{22}) x_1 + a_{22}$

| Clean strategies for the second player II | Expected winnings for the first player |
|---|---|
| 1 | $(a_{11} - a_{21}) x_1 + a_{21}$ |
| 2 | $(a_{12} - a_{22}) x_1 + a_{22}$ |

The first player's I win is $\bar{y} = \min\{ y_1, y_2 \}$ and he strives to maximize his profits $\bar{y}$ reaches a maximum at $y_1 = y_2$ i.e., at $(a_{11} - a_{21})x_1 + a_{21} = (a_{12} - a_{22})x_1 + a_{22}$.

Therefore

$$x_1^* = \frac{a_{22} - a_{21}}{a_{11} + a_{22} - a_{21} - a_{12}}, \quad x_2^* = 1 - x_1^*$$

Dimensions $y_1^*$ and $y_2^*$ are determined similarly, but according to the points $(0, a_{12})$, $(1, a_{11})$, and $(0, a_{22})$, $(1, a_{21})$.

Which define the do respectively $y_1$ and $y_i$, $y_l(y_1) = (a_{11} - a_{21}) y_1 + a_{12}$.

Formulating a matrix game as a linear programming problem allows for a player to determine the optimal winning strategy. Let $x_i$ be defined as a vector that consists of all probabilities that the first player follows, such that $x_i \geq 0$ and $\sum x_i = 1$. Similarly, a vector $y_j$ can be defined as the probabilities that describe the second player's actions. Then, the expected payoff from the first player to the second can be expressed as $\sum x_i p_{ij} y_j = x^T P y$.

Noting that this is a zero-sum game, the optimal strategy for the first player to employ is to minimize the payoff $x^T P y$ to the second player[1]. Therefore, a generalized optimal strategy for the first player can be represented as the following LP [10-14]:

$$\min \sum x^T P y$$

s.t. $\sum_{i=1}^{m} x_i = 1$

$x > 0$

Note that, on the other hand, the optimal strategy of the second player is to maximize the payoff from the first player (Fig. 2, Fig. 3). Given the objective of the first player, the objective of the second player can be expressed as $\max_y \min_x x^T P y$

---

[1] The formulation of game theory as a linear optimization problem is taken as a ready-made text from the site:
https://optimization.mccormick.northwestern.edu/index.php/Matrix_game_(LP_for_game_theory)
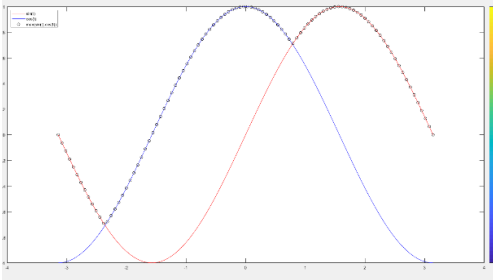
*Fig. 2. Solving the fminimax function in Matlab*
*Fig. 3. Solving the fminimax function in Matlab in space*
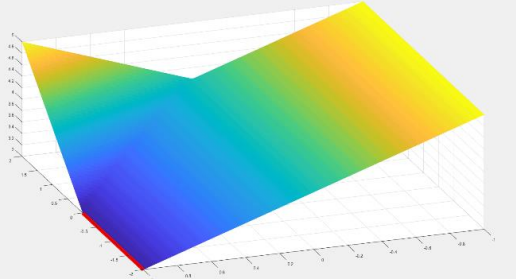
On the left are the derivatives of probabilities. On the right, there are as many members as there are arrows that associate the condition with other states. If the arrow goes out of state, the corresponding member has a "minus" sign. If the arrow enters the status, the "plus" sign is [5, 6, 8]. Each member is equal to the product of the density of transition probabilities corresponding to the given arrow multiplied by the probability of that state from which the arrow originates (Fig. 4).
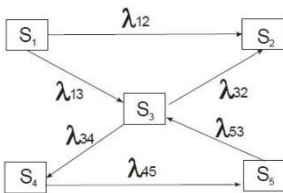


*Fig. 4. A system with 4th transitions and given transition densities Example Define $p_i(t)$ (these are functions of time). The system S is given with five states and the corresponding densities.*

$$\frac{dp_1(t)}{dt} = -(\lambda_{12} + \lambda_{13})p_1(t)$$

$$\frac{dp_2(t)}{dt} = -\lambda_{12}p_1(t) + \lambda_{32}p_3(t)$$

$$\frac{dp_3(t)}{dt} = -(\lambda_{32} + \lambda_{34})p_3(t) + \lambda_{13}p_1(t) + \lambda_{53}p_5(t)$$

$$\frac{dp_4(t)}{dt} = -\lambda_{45}p_1(t) + \lambda_{34}p_3(t)$$

$$\frac{dp_5(t)}{dt} = -\lambda_{53}p_1(t) + \lambda_{45}p_3(t)$$

With initial conditions at $t=0$ $p_1=1$ $p_2=p_3=p_4=p_5=0$

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# ICT in Education

# An ICT Based Approach for Italian as L2 in Multi-cultural Classes

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## Abstract

*Nowadays current migration streams are changing the scenario of educational system in Italy as well, and the increase of multicultural classes with different learners without any or poor competence in Italian language is an issue teachers and educators have to face. The acquisition of a basic vocabulary and social communicative functions in Italian language is mandatory and not really easy in such a heterogeneous group. Providing a support in the acquisition of the mother tongue of the country of arrival is necessary although it takes time and is not enough to fill the initial gap among learners. In this case, not only a peer-to-peer strategy and classroom asset but also a CLIL approach based on ICT can prove to be a successful methodology. ICT language is universally shared and action based, moreover the support of free online translation software is helpful. In several years of my experience of ICT based methodology in teaching foreign languages this approach has proved to be effective to promote the acquisition of foreign languages. In this way applying it to improve competence in Italian language in foreign learners from abroad attending my classes has reduced the initial language gap more effectively. In this paper some examples of learning units are provided.*

*Keywords: ICT in Education, Studies on language Learning*

## 1. Introduction

Migrations and movements of people from and to other countries is a phenomenon which has been involving our world since centuries, but in a more recent time it has become quite significative with different migration waves, one of the last one considerably interesting Italy. As the society is changing becoming multicultural, so education has to cope with this new input which is getting increasingly strong. The pluralism of cultures, religions, traditions, languages urges the need of an answer to create an intercultural dialogue mostly within the school where all these different inputs converge and integrate. In the context of students with non-Italian citizenship, it is needful to focus attention to newly arrived students or rather students who enter the Italian school system for the first time. In addition to the problems of integration within a class and within a structured system all foreign students have to face, they must deal with the problem of knowledge of the Italian language.

One of the first steps, therefore, is to promote communication filling the linguistic gap with the native peers and creating the proper condition to learn.

## 2. A Multicultural Class

A standard multicultural class in the Italian school system can include, in a group composed of Italian native students, a small and variable percentage of foreign students,

which can belong to the same culture and nationality of origin or can belong to different ones. It can happen more frequently to have classes in which there are one, two or three students coming from different nationalities. The first issue for the teachers of each discipline is to find the tools to open communication in order to promote dialogue, realizing what can be different in order also of other linguistic styles but also alphabets and learning attitudes. The task is really complex depending also on the culture and language of origin. Italian language owns a complex grammar and functional structure, not so easy and not so immediate depending on the linguistic system the students come from. Some of them can have a slight oral or both oral and written competence in Italian, coming from a family where Italian is spoken or used as second language, although most of them can have no knowledge at all. For these students' additional extra hours in the school system as well as the presence of a cultural mediator are planned to make their inclusion easier and to get a basic survival level of competence in Italian language.

Most of the time, however, they attend general class lessons in Italian language.

In my experience teaching in a low secondary school, the students are from 11 to 14 years old, different nationalities and different level of competences in the language of arrival, most of them with no competence at all. Beyond the linguistic support and the differentiated courses of Italian for foreigners, the teachers of the other subjects must intervene on their teaching method in order to communicate dynamically with these students. To achieve the same learning objective, different strategies must be adopted for the foreign language student. In order to actively follow the discussion of a topic, the foreign student will need to acquire a specific vocabulary. Firstly, entrance class vocabulary is needed and, further on, the acquisition of specific ones related to the different disciplines. As it is, thoroughly, the language the place where they live and they express their life, they can acquire the language by playing, walking on the street, watching television, listening to people who speak. It is therefore a mixed learning situation, which takes place in explicit and intentional situations and moments dedicated to their specific linguistic problem. This awareness must be clear to the teachers who take care of the students to establish continuous transfers between the two-moments.

Foreign students have two orders of motivation to learn the Italian language, one is communication and the other is to learn other contents through school. That is the reason why a CLIL approach in building specific vocabulary learning situations, and ICT learning by doing can be very effective. Very often the teacher could guess whether accompanying with a simple gesture the contents improves the communicative and linguistic context, but it is never appropriate as many cultures have other gestures as well.

## 3. Strategies Based on ICT

On the basic assumption that ICT is a universal language, that computers and smartphones are universally used, known in their use and functions and thanks to the translation applications a common language can be found immediately in order to promote sociality and dialogue through peers speaking different languages and through teachers and foreign students.

The strategy used to build learning units is based on digital tools and devices, on Visual and Oral approaches and, only in a second time, on the introduction of written words and letters, more than ever as many cultures own a different alphabet and this is a big issue to face (in Italy for example Chinese communities).

The topic has to be set within the students' world: me (name, age, travel, history ...), the classroom, school objects and actions, family, home, on the street, time (days, months, date), weather, food, the meeting with the other, the other, school life and the

urban context where they live, the first approaches to "civic" needs. Only when these topics are rather consolidated the specific vocabulary of each discipline can be implemented.

For each theme the first step is *Listening and Comprehending*, *acquiring* as more words related to the topics listed above as possible.

Some hints in their mother tongue can be useful but, as the teacher cannot have knowledge of all the native languages the students own, the use of Images is really primary as it is Universal.

A combination of Sound and Image through different apps which can work both on computers and on smartphones allows an easier and faster acquisition of vocabulary, words, verbs, and consequently a proper combination of verbs and nouns, adjectives, building up a competence in foreign language.

**Example 1**

**Learning Unit** *Me and my environment My Class* (Io e il Mio ambiente La mia classe)
**Target Group** Foreign Students, age 11-12, with no competence in Italian Language
**Aims** Acquisition of the Vocabulary related to the Classroom Objects and their use
**Methodologies** Oral and Visual approach deduction through exercises
**Tools** Interactive Board Smartphones Tablets Laptops Wi-Fi Connection Apps
**Activities** Presentation on screen Oral introduction of the lexicon focusing on pronounce

Choice of the same words to practice with different tools,

Step 1 Image recognition,

Step 2 Use of ICT,

Step 3 Matching sound related to the word identifying the object Kahoot (online quiz) [Fig. 1],

Step 4 Practice repeating the pattern exercises Learning Apps match the pairs [Fig. 2],

Step 5 Matching Sounds and Letters (spelling and words) hangman [Fig. 3].
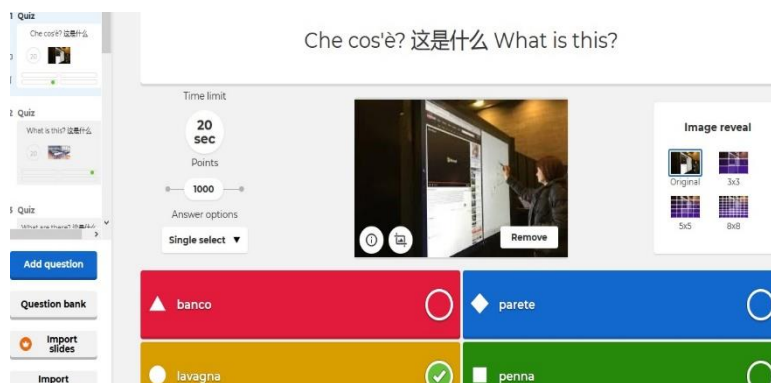


*Fig. 1. Kahoot Multilingual Quiz*
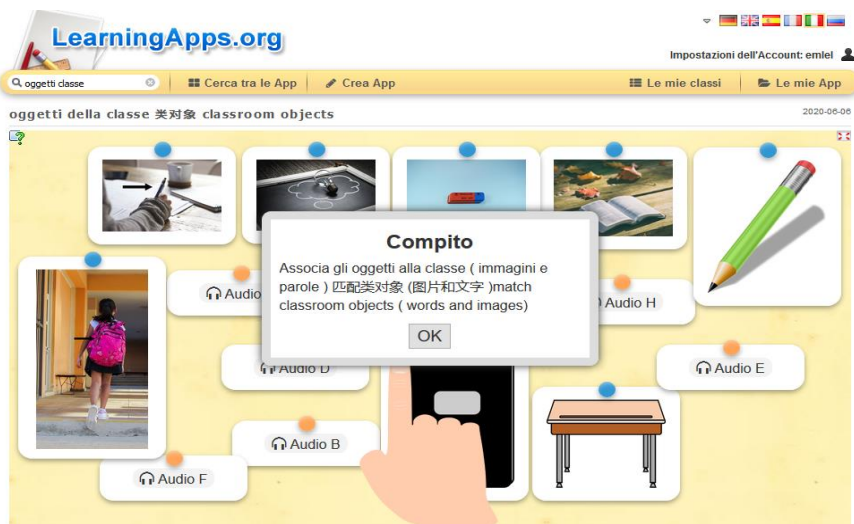
*Fig. 2. Learning-Apps matching Quiz*
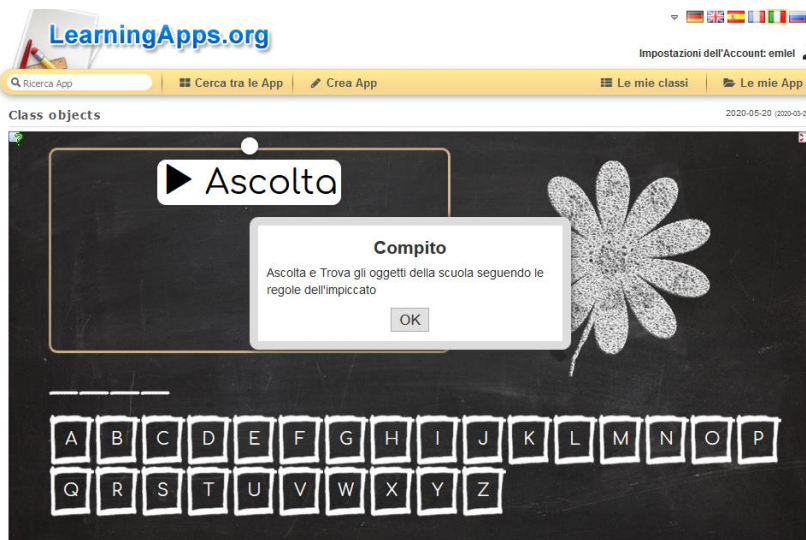


*Fig. 3. Hangman audio filling with alphabet letters*

**Example 2**

**Learning Unit** *The weather* (Il tempo atmosferico)
**Target Group** Foreign Students, age 11-12, with no competence in Italian Language
**Aims** Acquisition of the Vocabulary related to the Classroom Objects and their use
**Tools** Interactive Board Smartphones Tablets Laptops Wi-Fi Connection Apps
**Methodologies** Oral and Visual approach deduction through exercises
Step 1 Image recognition
Step 2 Use of ICT
Step 3 Matching sound related to the word identifying the object
Step 4 Practice repeating the pattern exercises [Fig. 4]
Step 5 Matching Sounds and Letters (spelling and words)

*Fig. 4. Learning-apps matching pairs audio and image*

Matching or Multiple choices exercises based on oral and visual inputs give an easier and faster tool of acquisition of skills as it is based on two shared languages, ICT and Images. Next step is the association of the Sound to the alphabet and in this case also the use of digital tools such as Hangman [Fig. 4] or other similar.

To test the level of competence another app can be created linking words and sounds as in Fig. 5.
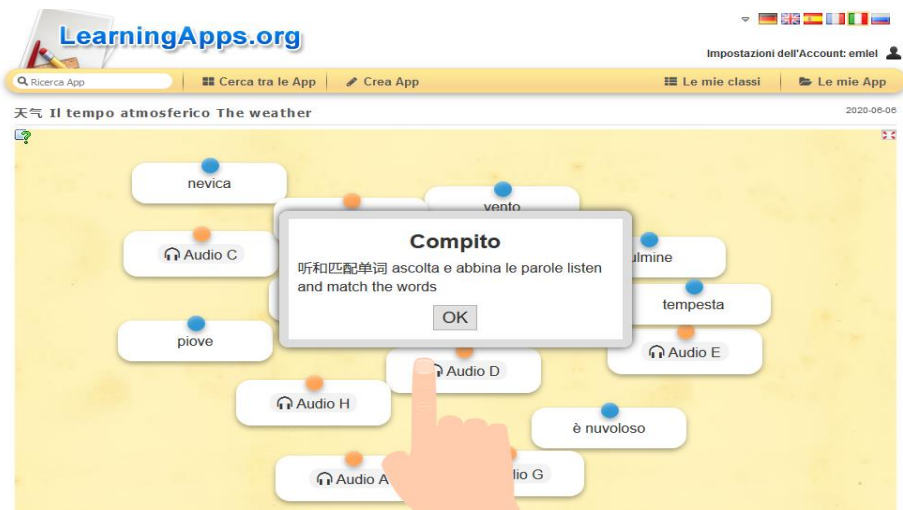


*Fig. 5. Learning-apps matching sounds and written words*

All these activities can be also proposed to the whole class of Native Italian speakers and foreign as well as a moment for inclusive games, to promote also the peer-to-peer reviews and the motivation in learning practising within the class group.

### 3.1 ICT remote learning after COVID-19 lockdown
After lockdown the perception of digital tools and devices has totally changed. Their main asset that is to ease distance communication and relation, applied to didactics revealed to be an instrument really useful to practice for all students and in particular for

the ones with communicational issues. The use of online virtual classes, of messages platform in different languages with a prompt translation tool guaranteed communication even with foreign students although the lack of an Italian speaking community around for some time can have, in some cases, reduced the motivation in learning. Digital tools can overcome language barriers although in some cases has not revealed to be the utmost inclusive instrument with disadvantaged families as they depend on a Wi-Fi connection which is not generally affordable and most of these families include the immigrant and foreign students as well.

**Conclusion**

ICT can prove to be a successful methodology in learning foreign languages. It can be applied to any foreign language and used at every level as ICT language is universally shared and action based, A proper use of Digital tools provides a strong increase in communication and interaction and eases to fill the linguistic gaps foreign students can feel as they arrive in a new context, lacking the basic instrument of communication.

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# Analysing Learner Motivation

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## Abstract

*Although Massive Open Online Courses (MOOCs) are far from new, language MOOCs (or LMOOCs as they are more commonly termed) are an increasing trend in many universities. This is so, mainly due to two factors: a) an increasing demand for high quality online course materials to cover the needs of professionals who would like to engage in lifelong learning, and b) the need for universities to be at the forefront of technological advances to gain more international visibility. This paper focuses on the author's experience designing four B2 level MOOCs for learners of English as a foreign language, which have attracted, to date, over 250,000 learners from 258 different countries. Two factors are discussed: motivation and attrition. Over 14,000 learner responses to a survey conducted longitudinally over a period of two and a half years is analysed to investigate some of the factors involved in learner motivation, expectations and learning styles. Moreover, as lack of guidance and scaffolding are factors that can lead to dropout, the solutions that were implemented in order to overcome these deficiencies will be outlined.*

*Keywords: Language MOOC design, upper-intermediate English, learner motivation*

## 1. Introduction

Given that there is great interest amongst MOOC designers and providers to understand what triggers learners to register for a given MOOC, how they interact with the course and, ultimately, what their opinion is in terms of effectiveness, the author implemented a Google Form questionnaire at the outset of the first of a sequence of 4 LMOOCs and another at the end of the last one. The LMOOCs in question are delivered on the edX.org platform (one of the major MOOC providers) and are offered as a "Professional Certificate" programme, that is, a "series of courses designed […] to build and enhance critical professional skills needed to succeed in today's most in-demand fields", according to the description on the edX website. This paper discusses some of the findings resulting from the survey, focussing primarily on the motivations behind the enrolments, as reported by the respondents, and the possible reasons leading to attrition, bearing in mind Xiong *et al.*'s [1] conclusions whereby motivation is significantly predictive of student course engagement and, in turn, engagement is a strong predictor of retention. Lastly, reference will be made to the solutions that were implemented to engage remote learners and, thus, decrease dropout rates. The 4 courses are described in the following section.

## 2. Upper-Intermediate English MOOC

Each of the upper-intermediate English MOOCs [2] broadly focuses on a different topic: (1) Business, (2) Modern Life, (3) Globalization and (4) Technology Today. The

workload in each of these is distributed into 4 "course" units (containing theory and practice geared toward practicing the language) and 4 "tester" units (which aim at helping learners assess whether their performance complies with the target level of English).

The content is structured into 5 sections: Reading, Writing, Use of Language, Listening and Speaking, all together adding up to over 100 activities with a varying number of items per MOOC. Each section is introduced with appropriate theoretical explanations followed by exercises. All theoretical content is embedded in the form of short video recorded presentations. The overall study time allocated to each MOOC is approximately 30 hours. The first MOOC was published in October 2018 and the rest followed sequentially, running on a calendar schedule. After the first run, all 4 MOOCs were made available on a self-paced basis. Learners can contact a teaching assistant via the Forum to formulate questions or doubts. To date, 15% of the enrolees have completed all 4 courses. The main reason given for not having completed the courses is allegedly due to time constraints caused by workload (77%).

## 3. Methodology

### 3.1 Participants

To date, there have been a total of 147.763 enrolments on all 4 courses. In Table 1 we can see the distribution in number of enrolees, median age, level of education, sex, and geographical spread.

*Table 1. Demographics*

|  | Enrolees | Median age | Level of education | Sex[1] | Geographical spread |
|---|---|---|---|---|---|
| MOOC 1 | 53,442 | 30 | 78.7% HE | F 46.1% M 53.4% | 196 countries |
| MOOC 2 | 39.667 | 28 | 74.1% HE | F 52.4% M 46.8% | 181 countries |
| MOOC 3 | 26.932 | 32 | 81% HE | F 47% M 52.6% | 149 countries |
| MOOC 4 | 27.722 | 27 | 72% HE | F 44.7% M 54.5% | 173 countries |

[1]*Not all respondents indicated this.*

As we can see, the average enrolee was a young adult with holding a qualification in higher education (HE) based in a varied number of countries around the globe. The spread among males and females is roughly equal.

### 3.2 Instruments

Enrolees were requested to complete the pre-questionnaire at the beginning of MOOC 1. It was divided into 5 sections with a total of 24 questions based on a 5-point scale and 15 open-ended questions. The number of respondents amounted to 14,167.

The post-questionnaire was made available at the start of MOOC 4 and was divided into 5 sections with a total of 71 questions based on a 7-point scale and 3 open-ended questions. Unfortunately, it has been impossible to cross-reference the information from both surveys due to the fact that, owing to technical issues, only 6 enrolees were able to complete the questionnaire.

## 4. Results and discussion

As pointed out by Barak, [3], "motivation is conceptualized as an internal state that arouses, directs, and sustains goal-oriented behaviour", it "is defined as the process whereby goal-directed activity is instigated and sustained", and "it determines whether or not a person will have a certain interest or be engaged in a certain activity".

Furthermore, "in the context of learning, motivation is conceptualized as an internal source which enhances, maintains, or mediates cognitive development". These facts led us to include 3 questions enquiring about motivation in the pre-questionnaire. These were:

- **QB8**. Rate the following factors according to how motivating they are for you to learn a language:
- a. An interest in getting to know and understand other languages and cultures
- b. A strong practical need in your life
- c. An internal drive to learn
- d. The influence of interculturality at home/personal background/learning community-based languages
- e. A need or willingness to communicate with people living in your area
- f. Rewards for your language learning achievements
- g. Your family backgrounds
- h. Willingness to travel
- i. Need to travel for work (current or future)
- j. Need to use other languages in the workplace (current or future)
- k. Possibility to get a (better) job

The options were: motivating (M), neutral (N) and not motivating (NM). Table 2 displays the results for each of these items.

*Table 2. Results for question B8 in percentages*

| a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|
| **M 87.6** | M 83.8 | M 71.7 | M 54.4 | M 49.2 | M 60.8 | M 22.7 | M 77 | M 70.7 | M 83.8 | **M 86.6** |
| N 11.1 | N 15.2 | N 26 | N 36 | N 35.3 | N 30.7 | N 46.6 | N 19 | N 22.4 | N 13 | N 10.7 |
| NM 1.3 | NM 1 | NM 2.3 | NM 9.6 | NM 15.5 | NM 8.5 | **NM 30.7** | NM 4 | NM 6.9 | NM 3,2 | NM 2.7 |

The results reveal that, out of the 11 options provided, the motivating factor that led them to enrol on the MOOC to learn English was primarily (a) a will to get to know and understand other languages and cultures, followed by (k) the prospects of being able to get a job or a better one. There is a tie in the third most popular option (b and j), each with 83.8%, which also reinforces the idea that both personal development and work-related motives are at the forefront. This is line with other studies such as [4, 5 & 6].

According to the motivational components that influence learning [3], we can therefore infer that enrolling on a language MOOC rests primarily on "personal relevance" (response a and b), which indicates the significance of learning to the learner's goals, and on "extrinsic motivation", which involves external incentives for learning, such as improving job prospects (response j and k). The least motivating indicator is (g) motivations stemming from family background.

- **QC3**. Do you think technology is more motivating than traditional language learning materials (like printed books, audio CDs, projectors, etc.)? Explain why/why not:

This open-ended question intended to seek information about the stimulation driven

by using technology versus more traditional means and was analysed by first categorising the responses and then interpreting the results quantitatively. A total of 50% reported technology being a motivating factor and 42% thought it was not. Out of the negative answers (70%), the vast majority of these referred to reasons relating to lack of human interaction, especially with a live teacher. A further 8% either did not have an opinion or saw the value in both traditional methods and technology-based approaches.

The patterns that arose and the frequency are displayed in Fig. 1.
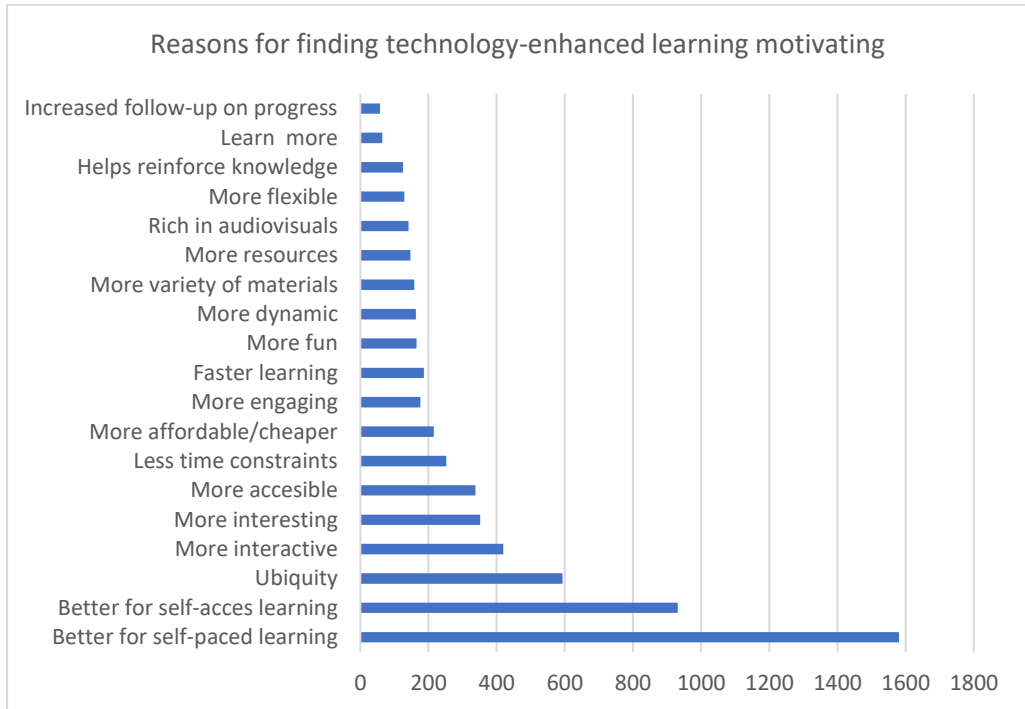


*Fig. 1. Responses to question C3*

Although the percentages in general were low, we were able to see several patterns emerging from the responses. The respondents indicated that technology-based materials were more motivating because they are better suited for *self-paced learning* (11.15%) and for *self-access learning* (6.57%), which is in line with the fact that they had registered on a MOOC. *Ubiquity* (3%) and *accessibility* (2.4%), together with *less time constraints* (1.78%) and *more flexibility* (0.91%), also repeatedly appeared. Cost was also indicated as many saw online materials as being *cheaper* or at least more affordable (1.52%) than other options. Regarding content, some responded that they found these materials *more engaging* (1.24%), *more fun* (1.16%), *more interactive* (3%), *more interesting* (2.48%), *more dynamic* (1.15%), as well as *richer in resources* (1%) and *audio-visuals* (1%). Some enrolees also indicated that these materials are useful because they *help reinforce knowledge* (0.9%) and because it is *easier to follow-up on learning progress* (0.41%), probably due to the immediate feedback and scoring systems normally integrated into such online courseware. Lastly, the speed and amount of intake was also commented: 1.31% believed that *learning was faster* and 0.45%, that they *learn more* with these means.

- **QC6**. The medium of instruction influences the student's motivation to learn.

Regarding whether the medium of instruction is a decisive factor, Figure 2 illustrates respondents' opinions: 62.09% agreed and 21.71% strongly agreed that they were influenced by this fact, which indicates that a vast majority of people are lured towards learning a foreign language through technological means because it is seen to boost their will to learn. An additional 14.43% had no opinion and a neglectable 1.58% disagreed or strongly disagreed (0.19%).
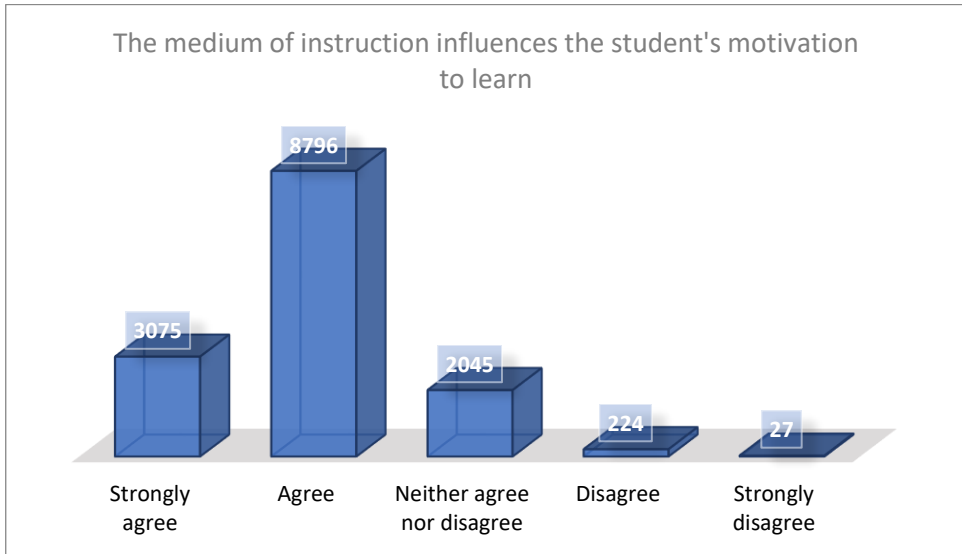


*Fig. 2. Extent to which the medium of instruction influences motivation to learn*

These results lead us to believe that those of us involved in MOOC materials design should take advantage of this trend and try our utmost to develop appealing and attractive content and resources so as to increasingly boost learners' motivation to take up language learning as a life-long activity, irrespective of the reasons that may drive them to this means.

## 5. Solutions implemented to prevent attrition

Because lack of guidance and scaffolding are factors that can lead to attrition [3], several solutions were implemented to overcome these deficiencies. In addition, because some of the more challenging areas in LMOOC design relate to providing opportunities for learners to practise speaking and writing skills, and being aware as we were that the Upper-Intermediate English MOOCs lacked real communication opportunities for the learners to produce authentic language exchanges, we designed a number of activities to support learner interaction and communication. These were programmed via Google Hangouts and conducted by postgraduate EFL teacher trainees, providing opportunities for enrolees to put into practice some of the content included in the MOOC. On the other hand, as automatic correction of written production is still not feasible to integrate, peer-assessment using specially designed rubrics was employed to evaluate open text activities, thus encouraging learners to become aware of their progress and engage in their learning process. For instance, to receive their assessment, they had to assess a minimum number of assignments written by their peers.

## 6. Concluding Remarks

Given that acquiring a foreign language is one of the most complex processes in learning, we would like to highlight the need to enrich an LMOOC with extra resources and strategies in order to intensify learner support, which can in turn translate into increased motivation. Additionally, self-access MOOC enrolees need to be given incentives in order to help them become efficient autonomous learners, and thus prevent current low retention rates, still oscillating in the 10% range [7].

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# Conceptual Design of an AI-Based Learning Assistant

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## Abstract

*Within interdisciplinary work processes, students are increasingly expected to develop transfer competences for complex, overarching content. We suggest the research-led development of a Digital Reflection Assistant. This AI-based tool is designed to foster students in developing and applying such competences. Based on the own evaluations and preliminary studies on the learning and working behaviour of our students, the tool is intended to promote a comprehensive understanding in interdisciplinary contexts as well as the development of integral solution processes in application-oriented project modules. The digital assistant serves as an individual, time- and location-independent reflection partner in the transfer process of the technical basics to specific, project-related problems.*

*Keywords: Artificial Intelligence, intelligent tutoring system, reflection, project-based learning, online-learning, interactive video*

## 1. Introduction

Interdisciplinary competences have become a crucial part of university education during the last two decades. Besides, the use of Artificial Intelligence becomes more and more relevant to the broad field of higher education [1, 2]. In this paper, we will sketch a conceptual design which will enable university teachers to bridge interdisciplinary skill building with cutting-edge AI technology. Our goal is to develop in a research-based manner a reflection partner implemented in application-oriented project modules. We build upon recent discourse on Knowledge Management in university education (see [3] with further literature). On the one hand, the digital assistant is a technology that can be used independently of a disciplinary context, and on the other hand, very specific technical content turns out to be particularly suitable for its digital scaffolding support functions.

Our field of application will hence be the building sector education at the post-secondary level. Challenges in this sector especially derive from the interdisciplinary content in combination with a high level of technical differentiation: Within the building sector, a multitude of engineering disciplines work together on technically sophisticated projects. For a successful project execution, it is necessary that each project participant has an overview of the wide range of activities within the project and understands the influence of his own services on other fields in order to act accordingly with foresight.

Architects in particular often have a coordinating role in projects and must understand the intersections of disciplines as well as their crucial planning aspects. Therefore, architecture students learn design aspects as well as legal, physical and constructional fundamentals. This is usually done in a project-related manner in order to convey the necessary methodological skills.

This diverse content with regard to the individuality of the respective student projects

as well as strengths and weaknesses of individual students requires intensive face to face supervision by the professors and their staff and requires frequent repetition of already taught basics, to support the students in transferring theoretical information to project-related application. OWL University is an ideal location within Germany for this specialist context: almost half of all German interior design students' study at the Detmold School, all of whom pass the examination in building physics/building services engineering.

The project will be considered successful if its students are guided within an ILIAS-based reference system with diverse forms of media mediation (*knowledge nodes*).

Those nodes are integrated in short interactive videos with dynamic content as a "springboard" to specific points within a complex knowledge tree structure, which serve as a trigger for reflection and to activate transfer knowledge.

## 2. Research-led Educational Development

In order to develop an educational concept for incorporating digital tools in teaching building physics for architecture students, a survey of 55 students was conducted during the winter term 2018/2019 [4]. The module *Building Physics and Technical Construction* is a module with a large proportion of technical and theoretical content that requires a high degree of transfer competences.

The main subject of the survey was the self-assessment of learning behaviour, learning methods as well as underlying documents and needs for digital tools. In addition, the survey also determined the degree of difficulty of individual topics.

In conclusion, the students mainly prepare themselves for exams by repeating arithmetic exercises as well as test exams and summarize lecture notes. In addition, 80% of the students search for additional information on the Internet. The desire for digital tools goes mainly in the direction of a digital wiki with technical expressions, videos on applying examples, regular anonymous test questions as well as videos with commented solutions in regard to mathematical issues. Yet, lecture recordings, a public forum, internal instant messaging or videos on fundamental knowledge from school are not considered relevant by the group surveyed.

Additional teaching experiences, especially in connection with the module "building physics", show that students are overstrained with time management due to the large number of project deliveries within the paralle-running modules. This results in individual priorities of the students in a way that many students do not participate in the supervisions at the beginning of the semester and demand especially last-minute supervision and rather need a time-independent opportunity to reflect their solutions.

Furthermore, it is apparent that the students need a lot of support in the transfer process to apply theoretical knowledge to their individual project task.

## 3. Conceptual Design of a Digital Reflection Assistant

To overcome the challenges described above, we have started to develop a video-based assistant which interactively combines a variety of learning and information formats and which serves the students as a personal, time- and location-independent reflection partner for the development of methodological competence. This enables abstract and theoretical contents to be exemplified by individual problems. Therefore, the assistant is a link between abstract, theoretical content to its project-specific application.

The key feature of the AI tool is an interactive video-supported linking of heterogeneous information sources and learning formats.

It is realized as a complex interaction tool using AI technology. It is based on an open source plugin "interactive video" for a learning management system (ILIAS). The interaction tool accompanies the module's teaching components by supplementing various educational support functions (scaffolds) and by offering both different learning paths and options for in-depth study of the learning contents [5]. The options for in-depth study are implemented as integrated online applications (e.g., recordings of lectures, glossaries, quizzes, arithmetic exercises, videos etc.). (Fig. 1)). We speak of an assistant, because the various functions help the students to learn in a highly personalized way, using their own, self-organized, self-chosen help functions and at their own pace [6] and because we will organize these functions according to specific user stories and combine them into a supporting character in the sense of a uniform teacher [7]. By this we mean a fictional person who represents a supervising teacher and who responds to the individual needs of the learners (e.g., by explaining specific technical terms, illustrating mathematical contexts with the help of topic-specific application examples or providing further interactive materials for self-study, but also by formulating important questions and providing food for thought). Thus, we programmatically follow the concept of user-oriented software design [8].

For this purpose, the digital assistant will refer to so-called knowledge nodes which are embedded in a learning management system. Knowledge nodes are particular learning formats as well as information sources (lecture material, standards/rules, data sheets, etc.). The AI assistant should encourage and systematically guide students to rethink and further develop their actual ideas. It allows for anonymous, independent reflection on one's own planning, which reduces the obstacles to taking advantage of personal face-to-face correction during the presence phase. At the same time, the digital assistant can consolidate and deepen skills and thus provide case-based impressions of interrelationships and interactions. It therefore facilitates individual, interactive and video-supported links between heterogeneous information sources and exercises and stimulates reflective thinking within the transfer process of technical fundamentals on project specific tasks.

The educational setting begins with the planning/design process as shown in the center of the assistant. Students start with their problem definitions (e.g., material selection, construction, type of technical equipment and so on). Interactive videos guide them considering their individual topics (e.g., thermal insulation, energy regulations, air quality) and continue with further questions (e.g., condensation, energy demand, air exchange). The videos provide relevant information, important hints and links to the knowledge nodes. The Reflection Assistant thus provides impulses and accompanies the students in the decision-making and development process to find their own solutions.
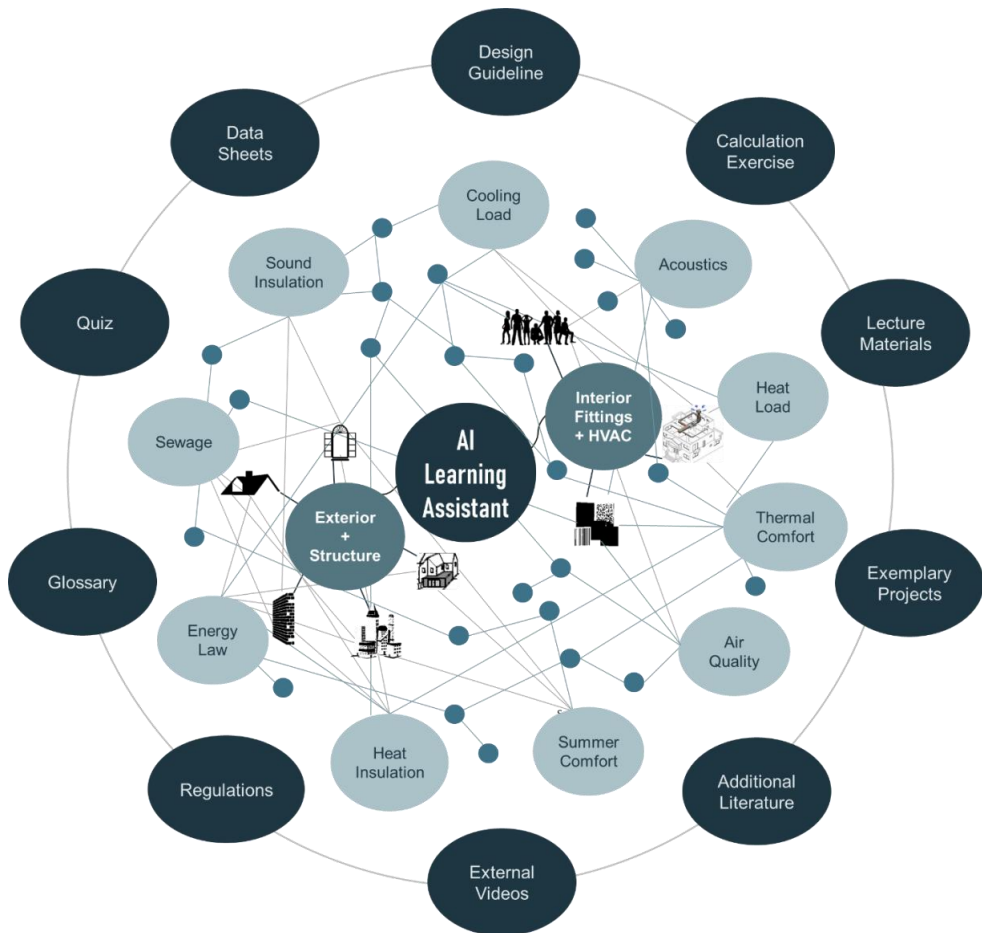
*Fig. 1. Reflection Assistant – a conceptual overview*

## 4. Summary

With the project presented here, we are pursuing the goal of developing a university teaching concept for the online-based mediation of demanding technical contents. Thus, the project pursues the task of reducing the technical complexity in an appropriate way, as well as the task of preparing this content on the basis of a media-educational overall concept and staging it within a Learning Management System in such a way that it can be used to promote academic learning.

The designed reflection assistant can be extended as desired to include several fields within building industry, such as structural engineering, urban and spatial planning, settlement and water management, and its implementation can also be transferred to many other interdisciplinary study fields.

All of our technological developments will be made openly available via GitHub (https://github.com/) and they can thus potentially be used by other institutions to integrate video-based digital assistants. Likewise, we will make the research-based external learning materials freely available together with our content as Open Educational Resources (OER), so that they can be used or further supplemented by third-party contributions.

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# Create 3D Models by Explicitly Describing and Moving the Virtual Camera Using EEG Signals

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## Abstract

*The use of computer graphics is now well accepted in computer science education. In the past few years, the subjects of computer graphics have played an important role in the research of information and computer technologies. The inclusion of elements of computer graphics in the curriculum is motivated not only by modern technologies, but also by the opportunities it provides. At the University of Library Science and Information Technology and Southwestern University "Neofit Rilski", subjects such as Computer Graphics, Graphic Design are taught for a number of years. In addition to visualization and graphical data processing, subjects are focused on practicing and expanding the knowledge and practical skills of students specializing in the exact sciences and humanities. In this report we present the goals, structure and educational techniques in the disciplines. We will also present some practical results. We will briefly present several software's that we use in our training. One of the main goals of our training is to stimulate the creativity of our students by using different approaches in creating 3D primitives. In this report, we will introduce different methods of creating complex 3D objects – by explicit description and by photogrammetry. We will present a new technology for moving a virtual camera through brain waves. An EEG (Electroencephalogram) signal is a neurons signal that is generated due to various electrical activities in the brain. Different types of electrical activity correspond to different states of the brain. Any physical activity of a person is due to an activity in the brain, which in turn generates an electrical signal. In this article, we will briefly describe the algorithms used to classify EEG signals and how these algorithms can be used to control the movement of the virtual camera.*

*Keywords: EEG Signals, moving the virtual camera*

## 1. Introduction

Graphics systems can only offer modelling tools (just a few), and it is the application that creates the model. The application program performs the following main activities, at the center of which is the geometric model [1-3]:

- maintenance – creation, deletion and modification of elements and links in the model;
- crawl for preview: presenting the geometric model information for the graphics system. This activity can be elementary for models whose objects are the very graphic primitives of the graphics system: segments, arcs and broken. It can

also be relatively complex if objects are not stored as graphical primitives, and each object is itself an algorithm for obtaining these primitives [4, 5-6];
- search and analysis crawl: this activity is related to the execution of processing algorithms, as well as some specific analysis on it. More complex interactive application programs are called geometric modelling systems due to the importance of the model and the presence of powerful tools to support it [8]. Real-world objects are rarely indivisible.

Even if they are solid, we model them as composed of parts, each of which has a specific functionality. The human body is indivisible, described as a structure of arms, legs, head, etc. that. The hierarchical separation of parts into objects that one creates is particularly clear. In designing, this hierarchy is best distinguished, where even each level of the hierarchy has a separate name: detail, node, assembly. The use of hierarchically structured components in a single model offers several advantages [2, 5, 7, 8]:
- the ability to create each of the components individually and independently of one another;
- complex objects are created by simply assembling constituent components;
- each component can be described only once and included as an integral part of many other objects;
- the ability to manage the change of objects by changing their components.

## 2. Methodology

Descriptive geometry was used before applying mathematical and computer models in the manufacturing process, design and production. Many of his methods have been ported to computer graphics. Surfaces are often depicted as a network of curves arranged in orthogonal secant planes with three-dimensional contours of parts [8]. Pierre Bezie proposed a method for creating curves and surfaces of any shape. It brings the mathematical basis of their method of geometric images. The result is equivalent to a Bernstein basis or a polynomial approximation function [8-10].

Basic B-spline functions are defined by Cox-de Boer recurrence formula.

$$N_{i,0}(u) = \begin{cases} 1 & u \in [u_i, u_{i+1}) \\ 0 & u \notin [u_i, u_{i+1}) \end{cases}$$

and higher-level functions (p≥1) are calculated by (Fig. 2)

$$N_{i,p}(u) = \frac{u - u_i}{u_{i+p} - u_i} N_{i,p-1}(u) + \frac{u_{i+p+1} - u}{u_{i+p+1} - u_{i+1}} N_{i+1,p-1}(u)$$
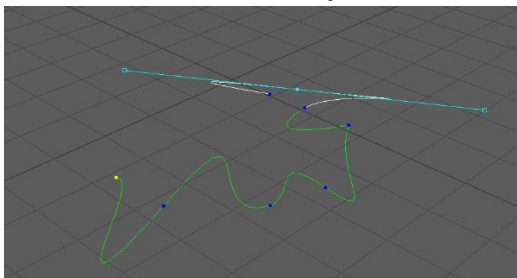


*Fig. 1. Bezie's curve in Maya Surfaces*
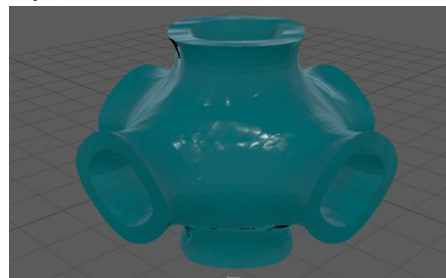


*Fig. 2. Surface from Maya*

Surfaces and their description play an important role in design and production.

Obvious examples are the development and production of car bodies, ship hulls, fuselages and aircraft wings; fan blades, turbines, compressors and blades; appliances, furniture and shoes. In this case, the essence of the structure, or for functional or aesthetic reasons, is the shape or geometry of the surface. Surface description also plays an important role in the presentation of data obtained in medicine, geology, physics, and other natural sciences [2].

It is advantageous to develop a "real" three-dimensional mathematical surface model in computer graphics and computer design. Such a model makes it possible to analyse the surface characteristics. For example, curvature or physical quantitative characteristics depending on the surface; for example, volume, surface area, inertia moment, etc., at an early stage and relatively easily. Surface visualization is simplified, used to develop or monitor development progress. In addition, in competition to the traditional method using a grid of lines, the generation of information required for surface production, such as control programs for a numerically controlled machine, is also significantly simplified [1-3, 8].

There are two main ideas that are the basis of methods for describing the surface. In the first, they are trying to create a mathematical surface according to previously known data connected mainly with the name of Koons {quotation}. In the second, they try to create a mathematical surface *ab initio* (from the beginning) mainly related to the name Bezie. Initially, industries related to numerical parameters, such as design, preferred the first approach, while industries that accounted for visual, tactile, or aesthetic factors, such as designers and artists, chose the second one (Fig. 1). Rogers' work on interactive ship hull and Cohen surface development systems have shown that the two approaches are compatible [8].

## 3. Result

Photogrammetry is a technique for determining the three-dimensional geometry (location, size and shape) of physical objects by measuring and analyzing their two-dimensional photographs. Generally, photogrammetry is divided into two categories: aerial and terrestrial photogrammetry. In aerial photogrammetry, images are obtained through aerial photographs of aircraft, providing topographic maps and details of land use.

In terrestrial photogrammetry (also called non-topographic photogrammetry), images are acquired at locations near or on the earth's surface and provide detailed information about the size of an object. When the size of the subject and the distance between the camera and the object are less than 100m (330 feet), terrestrial photogrammetry is further referred to as close-up photogrammetry, an approach whereby images are obtained around an object with strongly approaching camera orientations, usually pointing to the center of the object [1].

Many successful and varied applications of short-range photogrammetry can be found in the fields of industry, biomechanics, chemistry, biology, archaeology, architecture, automotive and aerospace engineering, as well as accident reconstruction, to name a few [2-4] (Fig. 3. Fig. 4).
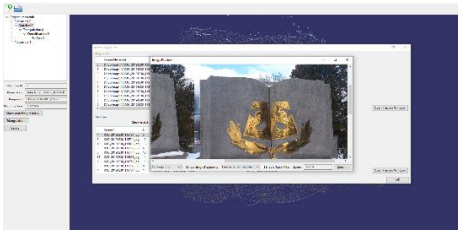
Fig. 3. Photo of the real object
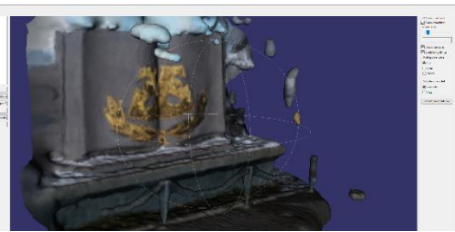
Fig. 4. Creating a real object through photogrammetry

Various methods are used for acquiring EEG signals. They differ in the way the electrodes are placed. The methods [10-13] can be categorized as follows:

a.   Invasive-Subdural EEG electrodes and Depth EEG electrodes,
b.   Non-invasive.

In our study, ECG signals were obtained using a helmet developed by eMOTIV. They were obtained at the University of Library Science and Information Technology by Prof. Dimitrov (Table1)**.**

| PICTURE_ | TIME_IN | AF3 | F7 | F3 | F5 | T7 | P7 | O1 | O2 | P8 | T8 | FC6 | F4 | F8 | AF4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LEFT.png | 1500 | 4109,49 | 4193,72 | 4094,74 | 4077,56 | 4108,21 | 4108,08 | 4108,33 | 4095,77 | 4093,72 | 4115,51 | 4116,54 | 4072,31 | 4089,49 | 4090,51 |
| LEFT.png | 1500 | 4107,31 | 4183,08 | 4072,05 | 4069,49 | 4110,64 | 4088,97 | 4109,62 | 4070,51 | 4065,51 | 4115,13 | 4114,87 | 4041,67 | 4057,82 | 4066,67 |
| LEFT.png | 1500 | 4104,87 | 4188,33 | 4078,72 | 4080,13 | 4111,54 | 4100,64 | 4107,69 | 4081,79 | 4074,49 | 4115,00 | 4114,10 | 4050,90 | 4070,26 | 4075,51 |
| LEFT.png | 1500 | 4114,10 | 4227,05 | 4122,05 | 4107,18 | 4112,05 | 4129,49 | 4108,33 | 4125,90 | 4121,15 | 4115,38 | 4117,69 | 4101,15 | 4127,82 | 4121,41 |
| LEFT.png | 1500 | 4110,13 | 4242,82 | 4136,41 | 4111,92 | 4107,69 | 4132,18 | 4107,05 | 4133,59 | 4132,18 | 4115,38 | 4118,85 | 4117,44 | 4148,97 | 4139,36 |
| LEFT.png | 1500 | 4106,92 | 4223,08 | 4125,64 | 4104,87 | 4109,36 | 4121,28 | 4107,44 | 4121,41 | 4115,13 | 4115,00 | 4115,26 | 4104,36 | 4136,79 | 4126,28 |
| LEFT.png | 1500 | 4112,05 | 4216,54 | 4135,00 | 4110,26 | 4115,64 | 4125,77 | 4107,95 | 4135,51 | 4123,46 | 4115,13 | 4114,87 | 4109,62 | 4137,69 | 4127,95 |
| LEFT.png | 1500 | 4106,41 | 4210,13 | 4133,21 | 4106,79 | 4113,46 | 4128,33 | 4108,72 | 4136,03 | 4126,03 | 4115,51 | 4118,08 | 4110,90 | 4127,95 | 4126,54 |
| LEFT.png | 1500 | 4108,21 | 4184,62 | 4108,33 | 4096,67 | 4110,13 | 4117,05 | 4109,49 | 4110,77 | 4104,23 | 4115,26 | 4116,92 | 4087,82 | 4102,56 | 4107,05 |
| LEFT.png | 1500 | 4110,77 | 4169,10 | 4102,31 | 4096,54 | 4110,13 | 4109,23 | 4109,62 | 4105,90 | 4097,44 | 4114,62 | 4113,85 | 4078,46 | 4102,56 | 4102,44 |

*Table 1. EEG (Electroencephalogram) signal generated in a computer lab by Prof. Dimitrov (2016) [11-12]*

The motion of the camera is generally described by ordinary differential equations.
The resulting description is often called a dynamical system.
Let $x = (x_1, x_2, …, x_n)$ denote an n-dimensional state vector and $x_i$ corresponds to a position or orientation parameter for a rigid body [11-14].
The integration of each state variable determines the value at time $t$.

$$x_i(t) = x_i(0) + \int_0^t \dot{x}(s)ds$$
,

We tried to classify the input signals as the observed subject thinking about the four directions.
We used three approaches for this purpose:

• K-Nearest Neighbour (KNN)
• Linear Discriminant Analysis (LDA)
• Naive Bayes.

These algorithms are described in detail by Umale 2016.
We used the script of AIDEMIR (2016) we got the signal classification. The classification was 27%, 25% and 31%. All simulations were performed in the Matlab system.
This result is not very good, but it does give us an opportunity for future research. Our goal is to develop a virtual museum in a mixed reality system. For our development we use Unreal engine and the language C ++ [14-16].

At South-West University "Neofit Rilski" and the University of Library Science and Information Technology, a project is underway to create a real 3D model of the ancient city of Skaptopara [17], located near Blagoevgrad. The first phase of this project ends in June 2020 and the results are quite promising.

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# Design of a Sensemaking Assistant to Support Learning

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## Abstract

*Thinking tools that assist by externalizing thought processes and conceptual structures so they can be manipulated potentially improve user learning. We propose the design of a sensemaking assistant that integrates many such tools. Our design emerged from an intensive study of sensemaking by users working on real tasks, providing a link from users to developers. Sensemaking is the process of forming meaningful representations and working with them to gain understanding, possibly communicated in a report, to support planning, decision-making, problem-solving, and informed action. At the heart of our design is a set of tightly integrated tools for representing and manipulating a conceptual space: tools for producing and maintaining concept maps, causal maps/influence diagrams, argument maps, with support through self-organizing semantic maps, importing concepts and relationships from external Knowledge Organization Systems, and inferring connections between texts; further a tool for organizing information items (documents, text passages notes, images) linked to the concept map. The sensemaking assistant we envision guides users through the sensemaking process; for each function it suggests appropriate cognitive processes and provides tools that automate tasks. The comprehensive sensemaking model introduced in specifies functions in the iterative process of sensemaking: Task analysis and planning; Gap identification (tools for both: brainstorming, finding documents on the task); information acquisition, data seeking and structure seeking (search tool: finding databases, query expansion, passage retrieval; summarization tool); information organization, building structure, instantiating structure, information synthesis/new ideas/emerging sense (conceptual space tools mentioned above); information presentation, creating reports (from concept map to outline, guide through the writing process [5], analyse draft writing for coherence and clarity). The system tracks sources. Users using a sensemaking assistant may well internalize good ways for intellectual processes and good conceptual organization in addition to learning a useful application. The paper will provide some evidence from the literature and propose further testing.*

*Keywords: Sensemaking assistant, thinking tools, computer support for learning*

## 1. Introduction

We present the design of a sensemaking assistant that can be used by users in the classroom or for work on assignments, to improve meaningful learning, Our design is based on a detailed observational study of users' sensemaking while they worked on real tasks, providing a link from users to developers [1]. We are not concerned with rote learning but with meaningful learning from a constructivist point of view – the user constructs the knowledge or understanding to be learned.

"Sensemaking can be defined as creating an understanding of a concept, knowledge area, situation, problem, to find a problem solution, to inform decisions and actions, or to support learning – integrating the newly found understanding into memory. An important part of sensemaking involves making clear the interrelated concepts and their relationships in a problem or task space". ([2], first sentence modified).

Figure 1 shows our model of sensemaking which defines component processes but stresses that there are many ways in which these components can be arranged and that the process is highly iterative.



*Fig. 1. A Cognitive Process Model of Information Seeking and Sensemaking
([2] p. 19)*

*Search – Building Structure – Instantiating Structure*. In this example, the sense maker:
• looked through her copied notes on polling results (search),
• added a concept "Nuclear Energy" in her concept map (building structure), and
• typed in "Mixed Reaction 47 for 41 against" (instantiating structure),
• then added another concept "Offshore drilling", and typed in "Repubs and Independents" (more building and instantiating structure)
• then searched again, found another concept, ...

*Fig. 2. Example of a Process Sequence [3]*

Sensemaking and meaningful learning involve representation and manipulation of the conceptual space, relating the user's internal conceptual space to external representations that provide new concepts and new data and creating and manipulating new external representations that can then be internalized. Our system is designed to assist the user in navigating texts, visualizations, concept maps, etc., extract concepts and relationships, build a meaningful structure, and use that structure to organize empirical data. Many cognitive processes (shown in Fig. 1) are available for users to use in this task [2, 3, 4]. Using these processes is a skill to be learned. They will be included in the tool box with explanations and examples available.

## 2. System Architecture

Our proposed sensemaking assistant consists of three components:
1.  an **interlinked multi-compartment data store**,
2.  a **workflow organizer** that guides the users through the overall sensemaking process
3.  a **toolbox** that provides many useful tools. We envision an open architecture such that many existing tools can be incorporated. Some tools are processes and techniques for the user to learn and carry out (such as advanced techniques in Google or cognitive processes in sensemaking), others offer mechanical assistance (such as highlighting text and creating a note with one click), and still others carry out complex automatic processes to deliver useful results (such a extracting concept relationships or definitions from text).

### 2.1 Data store
Comprehensive sensemaking uses and produces many types of information objects, for example, queries, search results, full-text documents, notes (consisting of text and tags) that may have quotes or summaries from papers or users' own insights, concept

maps (which, in turn, consist of nodes and typed links (arcs), entity-relationship statements, final report, events in the action history, the user profile. All these information objects are stored in the database, many tools, such as notes software or concept mapping software, have their own store, which must be linked by the system.

## *2.2 Sensemaking Workflow Organizer*
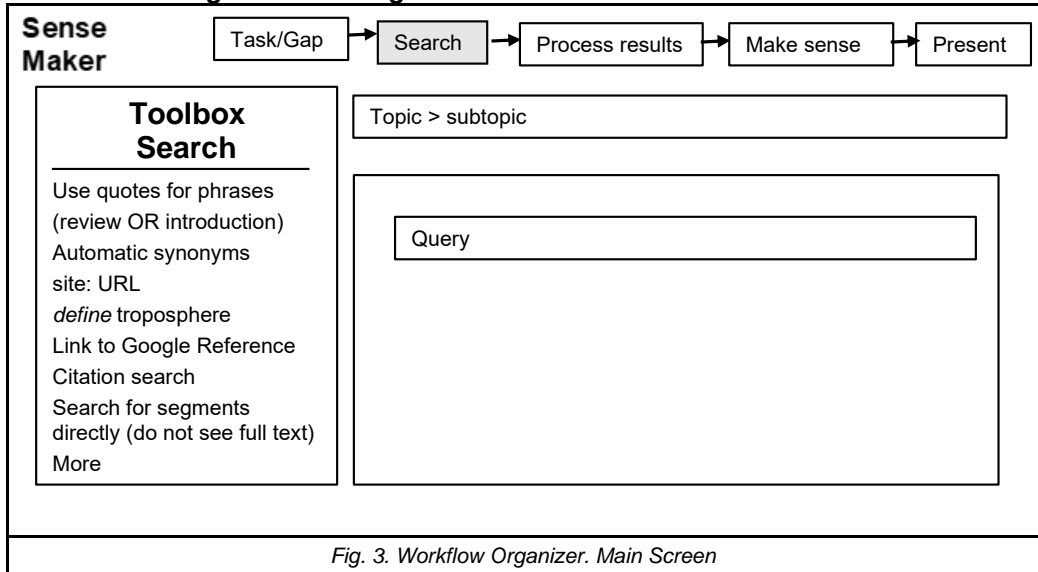


Fig. 3. Workflow Organizer. Main Screen

First the user is presented with the main screen shown above. Task/Gap is highlighted first. When the user clicks it, she will get to the screen for entering the description of the task, consisting of a title and ideally a few lines of text, and a description of the information gap. If there is enough text, the system will use linguistic analysis to create a draft concept map the user can edit [5]. Or a user can draw a concept map instead of entering text. There would also be a checklist of types of tasks that needs to be developed. Some examples:

- Learn about/write a paper or report about a plant or animal, a geographical feature, an historical or contemporary situation or event, a disease, or a surgical procedure
- Define a topic for a research study, including theoretical framework, variables, significance

Upon completing the task description, the user in returned to the main screen with **search** highlighted and the most important search tools listed in the tool box on the left (as shown in Fig. 3). The system may have pre-filled the query for the user to edit.

The user can refine the query using Google (default search engine) syntax options, or she can click *automatic synonyms* for query term expansion. With a highly advanced search engine that can represent document content as a document concept map, a query concept map can be used for more precise search. The system will also use the user profile to filter results, for example by appropriateness to the user's reading level and subject knowledge. The user can also bypass search and paste results into the result box.

**Result processing and making sense** overlap. Just to mention two tools:

- To judge the relevance of a document or segments, consider its contribution to the task/topic: *directly relevant, comparison to similar topic, providing context*.
- Extract relevant segments, manually with the assistance of note taker software or automated.

**Presenting/authoring** can be supported in many ways. There is even software that helps young children tell a story in pictures.

There will be much back and forth in going through these steps. While making sense or even while preparing the presentation a new information need may surface and a new search is needed. Search may be external or just internal to the system. During authoring a need for further clarification in sensemaking may surface.

### 2.3 Tool box

At the heart of our design we envision a set of tightly integrated tools for representing and manipulating a conceptual space. The comprehensive sensemaking model (Fig. 1) specifies functions in the iterative process of sensemaking: Task analysis and planning; Gap identification (tools for both: brainstorming, finding documents on the task); information acquisition, data seeking and structure seeking (search tool: query expansion, passage retrieval; summarization tool); information organization, building structure, instantiating structure, information synthesis/new ideas/emerging sense (conceptual space tools mentioned above); information presentation, creating reports (from concept map to outline, guide through the writing process)There are no limits to imagining useful tools. Table 1, while it is big, gives just a smattering of examples. For many of the tools one or more implementations exist (a few are referenced), others are admittedly more "pie in the sky".

| Table 1. Example tools sorted by function | |
|---|---|
| **Tools for many steps** | Use Knowledge Organization Systems (KOS): <ul><li>to show concept connections to the user,</li><li>to help with search terms</li><li>show concepts in KOS context</li></ul> Adapt methods shown, relevance relationships, other elements to subject area <br> Keep source with everything <br> Support for idea generation from bits and pieces of information collected <br> Search for analogies <br> Concept maps, causal maps/influence diagrams, argument maps, support through self-organizing semantic maps, importing concepts and relationships from external Knowledge Organization Systems, and inferring connections between texts [6], [7] <br> Templates, frames (for evaluating documents, for writing a document of a given type) |

| Search tools | Use quotes for phrases<br>In Google (and other search engines) use Boolean OR (review OR introduction)<br>Automatic use of synonyms (query term expansion)<br>Automatic use of hierarchy (hierarchic query term expansion)<br>site: URL<br>Use Google "define", for example define troposphere<br>Google Reference [8], [9]<br>Use citation search. Where available, use reason for citation both forward and backward<br>Query formulation by relevance type<br>Find document segments that are relevant<br>Find things that might spark a new connection |
|---|---|
| Result processing tools | Organize relevance judgments using relevance relationships<br>Extract relevant segments, manually with the assistance of note taker software or automated.<br>Multi-document summaries<br>Reading support: Provide definitions on mouse over<br>Support understanding of documents through helping user extract, then organize segments [10]<br>Identify topics in search results-clustering, often used terms<br>Note taker. Copy selected text to notes with source |
| Sensemaking tools | Note organizing tool with the ability to link nodes in a concept map to notes [11]<br>Make connections based on same entity or concept mentioned.<br>Knowledge representation for sensemaking, concept maps etc.<br>Populate concept maps from Knowledge Organization Systems<br>Populate concept maps from information extraction<br>Simulation<br>Animation<br>Visualization. graphical representation<br>Cognitive processes for sense making |
| Authoring tools Presentation tools | Word processor with outlining capability<br>General assistance with writing [12]<br>From concept map create a paper outline (may be automated), considering<br>Automatically place notes into a document outline<br>Analyse writing for<br>Analyse draft writing for coherence<br>Analyse a slide presentation or website for clarity, readability (font size, contrast), and other aspects of usability |

## 3. Conclusions

We presented an ambitious design for a sensemaking assistant that could be implemented incrementally, incorporating many existing tools for specific functions.

Sensemaking tools for use in professional practice exist (for examples, see [14]), but our design improves on them. We envision that our system could adapt to a wide range

of users, from elementary students to professionals. We are not aware not aware of such systems being used in K-12 or higher education, but we claim (as of yet without proof) that students using a sensemaking assistant may well internalize good ways for intellectual processes and good conceptual organization in addition to learning to use sensemaking tools in general. The system can also be used in teaching/training mode since it does include tools for presentation. While for learning constructing one's own concept maps is best, some information can be absorbed better when presented as one or more concept maps than as text.

Our design aims at combing intelligent information processing with the power of the human mind to achieve optimal understanding and problem solving.

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# Developing Tools for the e-Learning Platform MathE

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## Abstract

*MathE (mathe.pixel-online.org) is an e-learning platform for higher education developed and implemented by a consortium of seven institutional partners from five European countries. The aim of the project is to enhance the quality of teaching and improve pedagogies and assessment methods by facilitating the identification of students' gaps in Math, providing appropriate digital tools and promoting self-evaluation with immediate feedback. The Polytechnic Institute of Bragança (IPB), in Portugal, is one of the consortium members: sixteen of its teachers collaborate in the development of this platform, being responsible for thirteen of the topics/subtopics in which the platform is structured. Such topics cover a wide range of contents, from linear transformations to integration, from graph theory to probabilities. The articulation of the topics of the MathE collection corresponds to the canonic mathematics content of engineering, business and education degrees. The MathE platform is organized into three main sections: Student's Assessment, MathE Library and Community of Practice. So far, IPB has already developed a collection of around 800 questions for the student's assessment section and is currently developing the MathE Library. More than 350 students from IPB are using the MathE platform; some offered as volunteers, whose role is testing the behaviour of the platform as well as looking for bugs and other details that require improvement, while others are already using the platform in their study. The feedback received up until now is quite encouraging.*

*Keywords: Active learning. Higher education. Pedagogical innovation. Digital resources. Distance learning. Mathematics*

## 1. Introduction

The teaching and learning process has progressed from a paradigm relying on expositive teaching to a paradigm centred on active teaching and on the definition of new roles both for teachers and students [1, 2]. The rise of new technologies has contributed to and promoted such change, enabling new forms of representation, self-expression and collaboration in knowledge [2]. E-learning is a concept arising from the

usage of information and communication technologies to revise and transform traditional models of teaching and learning [3]. According to [4], e-learning constitutes a broad approach that brings new opportunities for learning and teaching outside the traditional classroom environment. Considering the views of [5], in the teaching and learning process, technological mediation – digital and online – stands as the fundamental identity element of e-learning. It is based on this attribute and its combination with others – distance, interaction with a tutor and/or existence of a trainer – that the concept of e-learning is built. According to the mentioned authors, e-learning as a teaching method is far from constituting a stable and consensual subject regarding theories and practices.

If technologies move forward at a speedy pace, pedagogical models, on the other hand, resist and change slowly and in an uneven rhythm. Hence the need to build an open device in constant evolution, ensuring its validity and conformity to the evolutions of the organizations and people.

Bezovski and Poorani [6] claim that if, at first, most concerns regarding the e-learning process focused on supporting technologies, they are now centred on the usefulness of platforms and tools and on pedagogical considerations. Regarding e-learning tools, many support synchronous and asynchronous learning such as videoconferencing, virtual classrooms, webinars, presentations, videos, audios, graphics, texts, wikis, blogs, chat-rooms and so on. As far as research is concerned, they remark that e-learning trends include, among others, combined learning, gamification, MOOCs, Software as a Service (cloud learning), personalized learning and continuous learning [7-13].

The MathE platform is a digital tool (https://mathe.pixel-online.org), that involves the collaboration of several European institutions from five different countries, such as the Polytechnic Institute of Bragança (Portugal), the Limerick Institute of Technology (Italy), the University of Genova, Pixel (Italy), Kaunas University of Technology (Lithuania), Technical University of Iasi (Romania) and EuroED (Romania). Each of the partner institutions has built a solid community of teachers, in the corresponding countries, that have been actively collaborating and responding to the challenges of the project.

The main goal of the MathE project is to develop proficiency in the teaching of mathematics in higher education (although some themes cover high-school contents and can be used at this level); MathE involves teachers and their students, as well as external participants who want to deepen their knowledge of mathematics. Students have access to pedagogical resources such as videos, classes, exercises, training tests with multiple choice questions and other formats, that are freely available in the MathE library, an online database of teaching/learning resources. Teachers can make their classes less orthodox and increasingly rely on the online resources that MathE offers.

The MathE project is already making a significant contribution to innovation in higher education, by developing and implementing the described new approaches for teaching and learning mathematical concepts. The use of the resources produced within the project and, therefore, the introduction of unconventional pedagogical practices in the scientific area of mathematics can be a valuable asset in the current transition from face-to-face to distance learning and to the introduction of b-learning formats that the current COVID19 scenario forces institutions to.

This paper is organized as follows. After the introduction section, the contributions and the way MathE operates will be presented in Section 2. Some observations about feedback from users will be provided in Section 3 as well as a brief explanation about the community of practice, in Section 4. Conclusions and possible directions for future work will be included in the final section.

## 2. MathE Developing and Contributions

The MathE platform is currently used by a group of more than 500 students (350 from IPB) and 50 teachers (16 from IPB), from ten countries. It is an open digital education tool that combines dynamic exams for self and final assessment, a library (with video lessons or other video resources and teaching materials – such as presentations, graphs, notes and books) and a community of practice. Therefore, the MathE platform relies on unorthodox types of resources and strategies to promote the students' interactivity, avoiding monotony and enhancing the effectiveness of the student's learning process and the student's learning experience. The variety of resources available within the MathE platform contributes to make the students' more autonomous, allowing them to organize their study at their own pace.

From the students' point of view, the MathE platform works as a repository of videos, written material that help them learn and online dynamical exams that allow them to test their knowledge, thus increasing engagement, motivation and sense of challenge as well as awareness of each one's situation regarding the considered course. The dynamical exams are randomly elaborated from a database of questions organized under topics and subtopics; each exam has seven questions randomly generated from the content of the database, considering a selected topic/subtopic.

From the teacher's perspective, MathE project promotes the use of digital educational tools and offers resources for the evaluation of the progress of the students' knowledge as well as discussion among teachers and researchers about good practices in math teaching, therefore increasing engagement and motivation.

At the moment, the platform covers 14 domains of mathematics, some of which are organized into subtopics, namely: Analytic Geometry, Complex Numbers, Differential Equations, Differentiation (2 subtopics), Fundamental Mathematics (2 subtopics), Graph Theory, Integration (2 subtopics), Linear Algebra (5 subtopics), Optimization (2 subtopics), Probability, Real Functions of a Single Variable (2 subtopics), Real Functions of Several Variables and Statistics. MathE offers 24 subtopics/topics and the IPB research team is responsible for the development of all the features related with 13 subtopics/topics. The assessment section is already implemented, having almost 800 questions. At this moment, the IPB team is developing the video lessons and the teaching resources for the library section.

Taking into account the structure of the MathE platform, it can be integrated in a course curriculum supporting lectures or helping the students maintain a continuous and regular learning effort throughout the semester. During the semester, the final assessment area can support the teachers in the elaboration of their own exams on the topics they wish to evaluate.

One of the most important features in the MathE platform is its video collection, with linkage to carefully selected videos available on the Internet. The selected videos are either produced by the project team members (among the several partners of the consortium) or are previously existing videos, publicly made available by a third party. The key common factor among all videos in the platform is their ability to help students and teachers to focus on particular aspects of the covered subjects.

For a student, the video library represents a handy tool, permanently available, to get that enlightening spark that allows one to pass from doubt and confusion to consistent knowledge about a specific math topic. For the teacher that worries about the student's performance, the MathE video library offers a way to help consolidating knowledge, especially in what regards overcoming the difficulties about basic mathematical facts, together with mastering the skills on each of the topics covered by the project. Hence, the teacher can elaborate specific – even individual – programs for the students and help

them improve their performance.

Both teachers and students can update this open digital tool, through the inclusion of new problems and resources, turning the MathE platform into a collaborative educational tool. All submitted materials are previously validated by elements of the MathE consortium.

## 3. Feedback from Users

By providing a considerable list of exercises on several topics, offering the student access to short videos and other online communication tools on the covered subjects, the MathE platform presents itself as a tool adjustable to classroom environment, to assess and learn the concepts under study, in a flipped classroom operating logic.

According to the feedback provided by teachers, about the experiences already carried out in their classroom, the MathE platform arises as a good option to practice and review specific mathematical subjects. It has been noticed that the work proposals mediated by this platform increase the students' involvement. The random generation of sets of questions determines that students work with different questionnaires, which requires greater autonomy. Submission of the questionnaire gives access to the results and, whenever an answer is wrong, the platform indicates the correct option and suggests a short video lesson or another source to clarify the issue. This makes it possible to overcome difficulties and understand the concepts and, in this process, students tend to question the teacher more often than in traditional classes.

In the classroom, the teacher may also choose to encourage collaborative work, through the proposal of group activities mediated by the MathE platform. Online questionnaires on already covered topics are regarded by students as challenges that they try to overcome and, for that reason, they become more involved and tend to develop skills of self-learning and conceptual understanding of the subjects. With this dynamic of group work, conversations with colleagues tend to be less oblivious to classroom issues.

The use of MathE Library (video collection and teaching material) to explore new subjects is also a possibility. It is intended that the collection of material and short video classes, still under development, will be an asset for the presentation and investigation of many of the main mathematical topics in higher education. Moreover, note that the teacher can also use this functionality to carry out the effective assessment of topics already taught.

Outside the classroom, MathE platform can play a key role in motivating both students and teachers to learn and improve their skills in the several mathematics topics.

With the MathE platform, teachers can implement a specific program especially designed for their students. This will help teachers to foster their students to evolve from simple to more complex knowledge in their disciplines. This is achieved through the careful selection of questions from basic to a more complex degree of difficulty (these degrees are identified in every question). The student can enrol the program with autonomy and its own velocity.

On the other hand, MathE platform can stand as precious tool for self-learning. In fact, students can take their own tour through the many topics covered, from the most important mathematical areas. The videos linked from the questions will help the students to get the necessary insights of the subjects and the assessment tool will help students to confirm the level of knowledge they have achieved.

## 4. MathE Community of Practice

Young people often regard mathematics as an extremely difficult discipline, dealing with objects that are strongly abstract and more or less incomprehensible. The community of practice forum gives voice to the students' questions and fears. In this forum, teachers and students will have an opportunity to discuss strategies to solve problems or to share interesting situations that arise in their practice. Conversations between students can be promoted with or without the intervention of teachers: in solving the exercises, challenges or in joint reflection about the obtained answers, debate can be launched.

Moreover, within the scope of MathE, an online guide to best practices in mathematics education will also be produced. Such guide will promote the exchange of learning experiences between teachers and researchers, as well as an increase in the internationalization, mobility and cooperation of teachers from different institutions and backgrounds.

## 5. Conclusion and Future Work

In an era when the Internet, the large amount of available digital resources and technological devices – and also the recent developments related to the COVID19 pandemic – are forcing all levels of the teaching system to reinvent themselves, it becomes necessary and urgent to implement different strategies in teaching and learning processes for all levels and areas, namely in what concerns Mathematics. The MathE platform is an online tool that comprises three main sections – assessment, library and community of practice – and can be used by students and teachers in order to motivate them to better learn and improve their skills.

Teachers and students from several countries are already relying on this tool; nevertheless, the users' community is still growing.

The IPB researchers developed around 800 questions for training and assessment, organized into 13 topics/subtopics. Videos linked to Internet sites are already available.

The execution of video classes is currently being carried on.

Until the moment the feedback received from the teachers and the students is encouraging. Teachers state that the MathE platform allows students to be more independent and proactive; their behaviour is reshaped and they are more engaged in the relationship with mathematical subjects.

Students' feedback indicates benefits taken from the possibility to elaborate one's own path throughout the topics available in the MathE platform.

As future work, the increase of questions' database as well as the number of topics of MathE portal is planned.

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# Information Communication Technologies and Legal Education Correlation in Russian Federation and European Union

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## Abstract

*World changes its cover day by day not only economically but also socio culturally, since the technological inventions directs the time flow on the basis of stipulated factors. Daily updates on technological sphere force the information communication technologies to dynamical improvement. It is obvious fact that, the modern global arena does not exclude the education particular with legal education which giving the direction state legislative policies in the face of professional lawyers who gets pro level legal education. Correlation among education, legal science and information communication technologies is undeniable from the perspective of adaptation of enumerated spheres to the challenges of modern world. The first part of paper is dedicated to the identification of relations and effects to each other of ICT and legal education. Analysis on well-known lawyers' papers and judicial practices opens the scene for deep approach on finding exact results. As a continuous of paper, authors aiming to handle the practices of prior State and organization which regulates the pulse of global arena. The talk is going about Russian Federation and European Union, since taking into upon the scale of effectiveness of hegemonies and instead of comparing state-state based analysis, authors makes innovatory approach with handling examples from State-Organization couple. Main tasks are finding core points of prior legislations of both topic objects. Moreover, the possible ways of interrelations between ICT and legal education, and dig out the fruitful results from these correlations and implementation to syllabus of education institutions.*

Evaluation of technology affected not only socio-cultural affairs but also legal matters which are playing huge role in community. Considering fact that, systematization of development of ICT does not wait for new changings or additions to domestic laws of countries. That is the reason, legal education which is the main factor of "human capital" of legal science tries to catch the development of ICT every single day. It can be occurred the question on relevance between legal science, ICT and their effects to each other.

The answer is quite simple and obvious. Whether in both procedure human plays the main role either in procedure of preparation of legal documentation or programming of ICT. [1. Dudin M.N., Shakhov O.F., Shakhova M.S., Rusakova E.P., Sizova Y.S. (2019)].

Today, the global market is being rebuilt by digitalizing all areas of business.

Digitalization has affected not only business, but also the main fundamental roots of business projects, which are called education. The global market is polarized by these effects, both Western and Eastern. The education sector also gets its share of this change. Sociocultural factors play the role of a link between education and the digital world, since from the Golden era of philosophy in Greece to the Millennium, the person

remains at the center of the entire developed cycle. Human development and integration in the digital age, people began to use digital tools not only to communicate with each other, but also for numerous fruitful purposes, such as business relations, e-Commerce, education, and even in Law.

In this article, the authors try to analyse the relationship between modern jurisprudence and ICT tools in two hegemonies-the European Union and the Russian Federation. Moreover, the authors analyse the main regulatory and statutory acts which correlates with ICT in EU and RF. However, as fresh legal act General Data Protection Regulation (GDPR) is still on the core point because of its actuality and scale of jurisprudence. [2. Shamsuvaleeva E.Sh., Kashapov R.I. (2012)]

European Union politically and judicially fully crates its own regulatory acts and norms which in some cases affects the society not only locally (at the country level) but also regionally even internationally. European Union as a pioneer organization cannot deprived itself from modern challenges on data protection and privacy. It is not surprising fact that GDPR is accepted as etalon even for the countries which are not located in the territory of EU. The most eye-catching factor is about the scale of GDPR that affects the tourists that situates within the borders of EU regardless of their nationality.

Education sphere in the face of legal education highly relates to the data protection and privacy affairs.

GDPR puts and defines the scale of parties as following:
- Universities, educational organizations that locates in EU
- Institutions which uses the personal data from the borders of EU
- recruits the people (students) from EU.

GDPR puts number of restrictions to institutions in regard with student's personal data and protection of privacy. Here talk is going about the information relating to an identified or identifiable data subject. For instance, all institutions should notify the current and future students on operation of personal data. For sure, all students are aware the online systems of universities which give good opportunity to them on keeping in touch with academic staff. Furthermore, it is possible, the student can confront the online dialogue between computer and them as following: "The system is asking to operate your personal data and we are kindly asking you to familiarize with our privacy policy". This kind dialogue appeared after adoption of GDPR and this is one of the good sides of it.

So far, institutions are not allowed to share or send to the third parties unless there is consent. Assuming that the student gave his or her consent on the operation of data, even in this situation institution is not allowed to operate data for negative purposes. [3. Kuznetsov, M. N. & Chumachenko, I. N. (2018)]

Coming to the legal education and GDPR relations, the authors handles the judicial practice (case study) which is the quite bright explains the final idea of importance and sufficiency of stipulated regulation. While we are describing the legal students, the first portrait comes to our mind as a person who deals with the only law and written legal document. Here situation is getting complicated because data protection and privacy is a bit new for legal science, considering fact that there is limited number of documents on enumerated topic.

Maximilian Schrems v. Facebook Ireland is one of the bright and well-designed judicial practice which opens the whole scene for comprehension of data protection and usage of data in daily life by big companies as Facebook. Maximilian Schrems is a citizen of Austria, law student who used Facebook since 2008 as an active user. His activities against Facebook divided into 3 part: the first complaint he made on activities of Facebook to the Irish Data Protection Commissioner in 2011. As a result, the company was investigated under European law and obliged to delete number of files. It was the

first glory of Mr. Schrems against the one of the biggest companies. In second level, he did not stop his performance and made a top stance with filing the company to Irish DPC again. He aimed to prevent the company to transfer the data from EU to USA in the frame of USA's PRISM mass surveillance program. His legal base was European Union data protection law. that prohibits the data transfer from non-EU member states, whether the company can guarantee the term of "adequate protection". However, he confronted the rejection of his complaint by DPC with the clarification of "frivolous and vexatious".

Mr. Schrems appealed to the Irish High Court for judicial review on passive approach of Irish DPC. At first glance, it looks like a loosing of case but Irish High Court decided to resolution of the case under the article 8 protection of personal data of the Charter of Fundamental Rights of European Union. Coming to the last level, Court of Justice of European Union (CJEU), there was offer by finding solution on case namely term of "adequate protection to refer the executive decision 2000/520/EC which was also called EU-US Safe Harbor Principles. [4. Rusakova, E.P., Frolova, E.E., Ocaqli, U., Kupchina, E.V. (2019)]

But Mr. Schrems also argued the offer since he alleged that Safe Harbor Principles also violated his basic right of privacy, data protection and there is no compliance with equal trial under the Charter of Fundamental Rights of European Union. As a result of court hearing, the decision was jaw dropping since Mr. Schrems reached and realized all claims: "national supervisory authorities still have power to examine EU-US data transfers despite fact that there is Safe Harbor decision by EC, the second is Safe Harbor decision is not void anymore since it gives chance to third party to interfere the state's internal affairs".

However, Mr. Schrems active work did not limit at the level of CJEU since after adoption of new regulation and right after coming to force on 25 May 2018, he applied to Irish DPC against Facebook again under the fresh regulation requirements which is called GDPR. The main claim was the force by two big companies towards users to share their personal data. Total amount of complaints was 3.9 billion EUR. GDPR played great role on his legal practice and he continued to sue companies as Amazon, Netflix, Spotify, YouTube. He established non-profit organization with the naming of noyb.eu and continues his active role in EU legal designation of data protection and privacy sphere.

As visual from the context, legal base on protection and privacy issues can lead to the bright future of students in the example of Max Schrems.

Russian Federation is one of the pioneer countries for its foundation on ICT and education. Correct harmonization of data protection and privacy allowed to the State for finding proper way to solve the disputes which arise from the privacy affairs and the effects to the education system. As starting the global pandemic due to the Covid-19 virus (coronavirus) in the world, Russian authorities started to take the exact measures for preventing the young generation from the infection. It effected the education and the working term of universities. The institutions changed the formation of conduction of classes from in person to online form and it gave chance to third parties to collect the data and share with third parties. Russian Federation regulates it within Federal Law on Personal Data (No. 152-FZ) which requires data operators to take "all necessary organizational and technical measures required for protecting personal data against unlawful or accidental access". [5. Akhmetov A.S. (2017)]

Coming to the conclusion on the stipulated issue, it is enough to mention that either personal or institutional data is not in safe regardless the existence of vast number of binding rules and regulations since third parties are interested in the corruption of data for their own purposes. Students are not also excluded from this range since in they are occupying the crucial place in education chain. Either European Union or Russian Federation attempt to make great their defence system on corruption of data but it is

quite difficult problem for them as visual from the examples of online programs, platforms, and Big data matters.

***Acknowledgements***

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# On Robotic Process Automation and its Integration in Higher Education

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## Abstract

*Worldwide, the higher education systems are confronted with various issues within a large bureaucratic setting. Time constraints, limited budgets and lack of human resources put strain on managing various tasks. In order to reduce the stress affecting teachers, students, and administrative staff in different departments, viable and easy-to-implement solutions are needed. The relatively young Robotic Process Automation (RPA) technology could allow reducing "the burden of repetitive, simple tasks on employees" [1]. Robotic Process Automation tools could allow the automation of a huge number of redundant manual processes. Recently, it has been noted that RPA starts to play an important role in various industries. The research firm Forrester predicts that the worldwide market for RPA services will reach $7.7 billion in 2020 and will grow to $12 billion by 2023 [2]. Although the recent development of this technology allows multiple benefits across various domains, educational institutions are slow to implement solutions based on it. There is limited research to investigate the solutions associated with RPA for various problems encountered in educational institutions. Taking into account the above-mentioned facts, this paper aims to provide some insight into the concept of Robotic Process Automation, as well as a broader perspective upon its successful implementation, in future, in the higher education system.*

*Keywords: Robotic Process Automation (RPA), higher education*

## 1. Introduction

As educational institutions around the world had to adapt to new ways of working as a result of measures to prevent the spread of the novel coronavirus (COVID-19), many are re-examining their operations, with a growing interest in digitalization. With students, employees (teachers, researchers and administrative staff), and partners all working remotely, more and more universities are eager to accelerate their digital transformation.

But, we must emphasize that in the last years, there has been a massive increase in the bureaucracy of education [3], as a considerable number of studies reveal. In addition, time constraints, limited budgets and lack of human resources put strain on managing various tasks.

Recently, it has been noted that Robotic Process Automation (RPA), an advanced technology that allows the automation of a huge number of redundant processes, begins to play an important role in various industries. The research firm Forrester predicts that the worldwide market for RPA services will reach $7.7 billion in 2020 and will grow to $12 billion by 2023 [2]. Thus, for example, according to [4], RPA accounts for the best return of investments (RoI) for 19% of respondents to this study made up of expert insights from over 400 companies (compared to 12% in 2018). Numerous applications, studies and reports show that RPA can prove incredibly useful to various domains. All

these represent a convincing argument for educational institutions (EIs) and their stakeholders to adopt the RPA-based solutions. However, although the recent development of this technology allows multiple benefits across various domains, educational institutions are slow to implement solutions based on it. There is limited research on RPA-based solutions for various problems encountered in higher education institutions around the world. Considering the above, this paper aims to give insight into the RPA application in the field of higher education (HE), for different users, such as: students, teachers, researchers and administrative staff alike.

### 1.1 Paper Contributions

Considering the above, this paper aims to answer the following research questions:

- What is Robotic Process Automation (RPA)?
- How have publications on RPA developed over time?
- How can higher education stakeholders benefit from RPA?

In order to provide answers to the above questions, the remainder of this paper is structured as follows. In the next section, we explore the concept of Robotic Process Automation by presenting some definitions of RPA, the evolution of scientific papers addressing RPA research, and RPA platforms. Following this, the benefits that RPA-based applications might entail to different categories of higher education stakeholders are described. The final sections present the future work on RPA application in higher education and conclusions of the paper.

## 2. Background of Robotic Process Automation

In recent years, Robotic Process Automation (RPA) attracts attention for productivity improvement. According to [5], "RPA aims to replace people by automation...", reducing "the burden of repetitive, simple tasks on employees" [1]. Worldwide there are several definitions, some of which are presented below.

### 2.1 Defining Robotic Process Automation

The Institute for Robotic Process Automation & Artificial Intelligence defines RPA as "the application of technology that allows employees in a company to configure computer software or a 'robot' to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems" [6].

The IEEE (Institute of Electrical and Electronics Engineers) Standards Association defines Robotic Process Automation (RPA): "A preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management" [7].

### 2.2 RPA Research Trend

In recent years, there has been a growing interest in Robotic Process Automation (RPA), as Google Trend shows (Fig. 1). We can visualize the relative popularity of these keywords between 2015 and 31 March 2020.
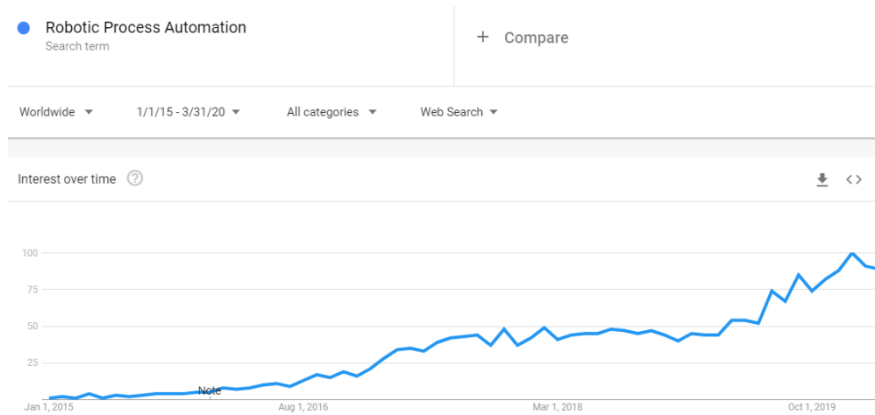
*Fig. 1. Search volume index for the data provided by Google Trends corresponding to the Robotic Process Automation search terms*

Moreover, the number of scientific publications that addressed Robotic Process Automation is quickly growing. In order to identify the current trend of scientific publications on the RPA, the authors of this paper conducted an extensive literature review, using available data from a number of five relevant scientific databases, including Web of Science, IEEE Xplore, Science Direct, Springer Link, ACM digital library. Fig. 2 shows the results regarding the annual number of RPA-related scientific papers, published between 2015 and 2019, as recorded in the considered databases. These results highlight the substantial increase in scientific publication of robotic process automation research over the study period.
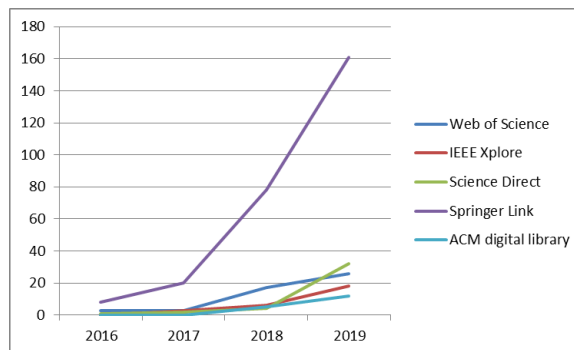


*Fig. 2. The evolution of annual numbers of scientific articles related to the RPA*

The limited scientific literature related to RPA offers widespread opportunities for future research and development.

### 2.3 RPA Platforms

Robotic process automation can offer multiple benefits to different fields, including higher education. Nevertheless, for a quick and easy development of RPA solutions, some could benefit from support of RPA platforms.

Currently, there are already numerous vendors on the market offering RPA software tools, including: Another Monday, Automai, Automation Anywhere, Blue Prism, Cognizant, Conduent, Contextor, Foxtrot, G1ANT, HelpSystems, Jacada, Kofax, Kryon, NICE Systems, OnviSource, OpenConnect, Pega, Redwood, Softomotive, UiPath,

Verint, Visual Cron, WinAutomation, WorkFusion, etc. Furthermore, every year an increasing number of new tools enter the market, each of them having different characteristics and benefits. At this time, RPA platforms are still in the early stages of maturity. Thus, according to [5], "to achieve more widespread adoption, RPA needs to become 'smarter'".

Experts estimate that as RPA platforms continue to grow and develop, more impactful and powerful RPA-based applications can and will be created and deployed in order to help a variety of workers from different domains, including higher education.

## 3. Applications of RPA in Higher Education Context

Given this understanding of robotic process automation, what are potential areas of RPA applications in higher education? To date, numerous applications, studies and reports show that RPA could prove incredibly useful across various domains. But, despite the evidence of multiple benefits of RPA, the impact that RPA has on the education sector is hardly considered.

When time, funds and resources are insufficient in educational institutions, RPA can facilitate the efficient use of all three. Thus, RPA applications in higher education can offer a wealth of potential opportunities to multiple stakeholders, such as students, teachers, researchers, admins, etc.

### 3.1 Use Cases

We propose to address educational RPA solutions from the following different perspectives: a) student-oriented, b) teacher-oriented, and c) admin-oriented.

Fig. 3 presents some examples of how RPA can be used in higher education by students, teachers and administrative staffs alike. Regarding RPA applications in administrative support services, RPA could be used across almost all administrative departments of a university, including secretary, finance, human resources, etc.

### 3.2 Benefits of RPA applications in higher education

RPA application in higher education could bring multiple benefits to all stakeholders, such as:

- Drive down costs. RPA not only allows the cost reducing, but it also improves efficiency.
- Time saving. RPA solutions allow saving time for teachers and administrative staff, by leaving the most repetitive tasks to RPA-based applications. Thus, it will allow them to spend more time in interactions with students.
- Place focus on more valuable tasks. Saved time that would otherwise be squandered in performing various repetitive manual tasks, could be used by teachers and administrative staff that teachers to focus more on creative work.
- Increased management capabilities. RPA allows higher education institutions to better manage operations and processes. It also allows the generation of critical reports for analysis and audit purpose.
- Improved student and staff experience. Reducing repetitive paper-based activities will allow academic staff to be able to focus on creative activities, etc.
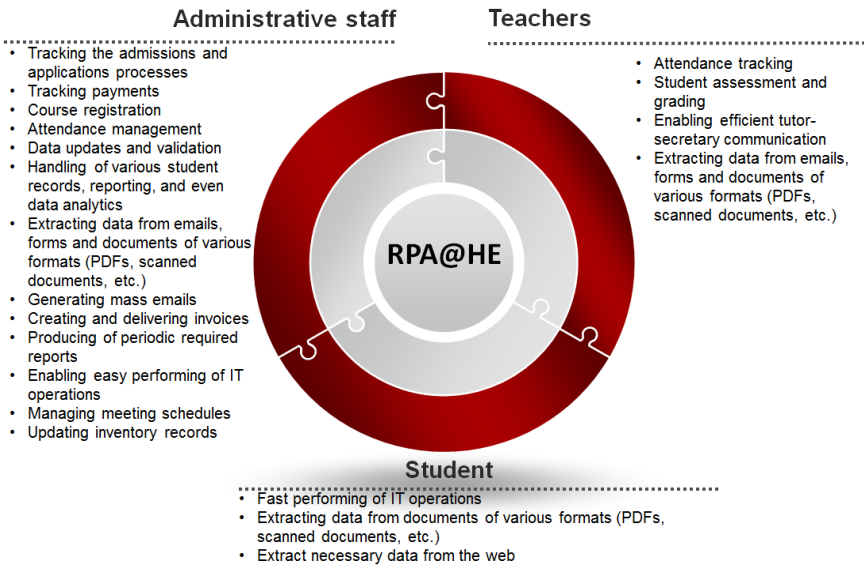
*Fig. 3. Use cases of RPA in higher education*

## 4. Future Work

Although RPA is currently used in various domains, implementation to its full potential is a real challenge. Worldwide, the potential of RPA in educational institutions is still being explored.

According to various scientific papers and international studies, "artificial intelligence (AI) applications in education are on the rise and have received a lot of attention in the last couple of years" [7].

In order to provide better products for complex processes, a solution aims to empower robotic process automation with Artificial Intelligence (AI), the next stage within the development of process automation being viewed as Intelligent Process Automation (IPA).

According to [7], intelligent process automation represents "a preconfigured software instance that combines business rules, experience-based context determination logic, and decision criteria to initiate and execute multiple interrelated human and automated processes in a dynamic context. The goal is to complete the execution of a combination of processes, activities, and tasks in one or more unrelated software systems that deliver a result or service with minimal or no human intervention". Thus, adding machine learning capabilities could enable intelligence-requiring tasks such as adaptation, self-learning, self-correction, etc. to be performed.

## 5. Conclusion

This paper explores the adoption of RPA technology within higher education.

Although by implementing RPA applications, educational institutions can see very quickly the benefits that they bring to teachers, students, researchers, and admins, however, many educational institutions are slow in implementing solutions based on this technology. This paper offers a perspective of the potential scale of RPA technology within higher education institutions in order to make them more functional and efficient.

RPA platforms had and will have an important role in the development of RPA-based

applications. Currently, there are many RPA platforms available, some of them being presented in this paper. Anyway, choosing the most appropriate platform to use could be a real challenge and a comparative study based on relevant factors is needed. In order to address RPA in the context of higher education, we considered different possible beneficiaries of this technology and we presented only several use cases, but some with great value and certain benefits. Notwithstanding, further potential RPA applications are vast. In order to take advantage of the opportunities that RPA can bring in higher education, several obstacles should be overcome.

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# Privacy Challenges when Implementing New Technologies in Education

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## Abstract

*In the world of today, the rapid technological advancement influences practically any sphere of public life. The education, a traditionally conservative system in Bulgaria, is no exception. Advanced technologies for video surveillance and algorithmic assessment of students become a reality rather than fiction. However, the usage of such technologies poses many challenges and even threats to the fundamental right to privacy of all participants in the educational process: students – who as per the European data protection legislation merit specific protection likely being less aware of the risks associated to the processing of their personal data; teachers; administrative staff working in the educational institution, etc. The present paper analyses some of the most common privacy issues that arise in the context of using ICT in the educational system. These include in particular: (i) the admissibility to install video surveillance and facial recognition systems for security and learning process control purposes in the school facilities; (ii) the legality of using automated tools such as algorithms and even artificial intelligence for assessing and evaluating students instead of a human teacher; (iii) the obligation to transparently inform the students as vulnerable persons about the processing of their personal data. The analysis is based on the Bulgarian and European court and administrative practice with particular emphasis on the opinions of the Bulgarian data protection supervisory authority – the Commission for Personal Data Protection. The conclusions made resemble the authors' experience as a practicing lawyer and as an academic researching from scientific point of view the problems of privacy and data protection in European Union (EU) law. Although focusing on the said problems from Bulgarian perspective, the paper can have practical implications and serve as a basis for future research in all EU countries which share the same data protection legal framework – Regulation 2016/679, better known as "GDPR".*

*Keywords: Privacy, surveillance, recording, transparency, algorithms, assessment*

## 1. Introduction

Nowadays, the rapid technological advancement affects any sphere of public life. Information and communication technologies (ICT) are being increasingly applied in education, a traditionally conservative system in Bulgaria. Video surveillance and algorithmic assessment of students are becoming a reality rather than fiction. The usage of such technologies, however, poses many challenges and threats to the fundamental right to privacy of all participants involved in the educational process: students – who as per the EU General Data Protection Regulation (GDPR) [1] merit specific protection being less likely to be aware of the risks related to the processing of their personal data [2]; teachers; administrative staff, etc. This paper analyses how these privacy risks can

be appropriately mitigated in compliance with GDPR – the new legislative standard in privacy which modern ICT-oriented education need to adhere to.

## 2. Video Surveillance and Facial Recognition Systems

The usage of video surveillance and facial recognition systems is widespread, including by small and medium enterprises. It comes as a no surprise that educational establishments (nurseries, kindergartens, schools and universities) also implement such systems for various purposes – protecting the life and health of students/teachers, securing the property, monitoring the learning process, establishing access control, etc.

The easier it is to install a video surveillance system, however, the more complicated the privacy-related issues regarding its legality are.

In Bulgaria video surveillance in education should be assessed in the light of the general prohibition on following, photographing, filming, recording or being subject to any other similar activity without the individual's knowledge or despite his/her express disapproval, except when permitted by law (Art. 32(2) of the Constitution of the Republic of Bulgaria) [3]. In addition, the permissibility of CCTV surveillance/facial recognition systems in childcare and educational establishments was analysed by the Commission for Personal Data Protection (the Commission) in two opinions.

According to Opinion Reg. No. П–5375/2017 of 30.04.2018 [4], installation of cameras in these establishments can be deemed permissible for the purpose of improving the security and transparency of care, for resolving conflict situations in the process of upbringing children, as well as for protecting the life and health of the most vulnerable category of society as a whole – children and minor Bulgarian citizens. The Commission identified two possible legal grounds under GDPR for this type of data processing – vital interest (Art. 6(1)(d)) and public interest (Art. 6(1)(e)). However, the Commission set the boundaries to which the surveillance is proportionate, namely video surveillance was declared not permissible in dormitories, bathrooms, rest rooms and rooms for personal hygiene of children. According to the arguments set out in the opinion, by installing such devices in the said premises, children would be deprived of the right to privacy and preservation of personal dignity and it would actually constitute a violation of the right to privacy. The Commission also emphasized the need to ensure transparency, more particularly by informing the parents/guardians and children about the video surveillance via warning signs containing details about the processing.

According to Opinion Reg. No. НДМСПО-17-916 of 21.12.2018 [5], the installation of entrance-exit cameras for facial recognition connected to a school electronic diary for the purposes of automatic identification of students and recording absences in the diary violates the principles of lawfulness and proportionality of the processing. Considering the explicit disagreement of the parents, the Commission found that such processing can be considered not permissible automated individual decision making based on sensitive biometric data. The Commission prescribed that the regular school attendance control should be conducted via less privacy-intrusive measures.

Important conclusions regarding video surveillance in education can be drawn from the above practice. It is generally accepted that certain universal values such as protecting life and health, security and transparency of childcare deserve enhanced protection, including via privacy-sensitive measures like video surveillance. However, a careful case-by-case assessment is necessary on whether the processing is proportional and each time it is excessive, it should be reasonably restricted.

## 3. Algorithmic Assessment of Students Without Human Intervention

The modern ICT computability capabilities make it possible to evaluate individuals, in the form of behavioural analysis/prediction, without human intervention. GDPR describes this type of data processing as "profiling" (Art. 4, 4) [6]. Furthermore, according to GDPR a machine (an algorithm, artificial intelligence, etc.) instead of human can theoretically make a decision, including based on profiling, that legally or similarly significantly affects an individual. This is qualified by GDPR (Art. 22) as an automated individual decision-making (AIDM) [7]. Such a scenario is possible in education as well where a school or university decides to implement evaluation techniques relying on automated processing only, i.e., where the assessment of students' performance is fully automated. Although this approach seems to have certain advantages, such as ensuring equal treatment and eliminating the elements of subjectivity and prejudice, assessing students via AIDM poses threats to the fundamental rights and requires careful application in line with GDPR.

A general prohibition on AIDM is introduced by GDPR (Art. 22(1)). It might be lifted provided that one of the following exceptions is present (Art. 22(2)(a)-(c)):

- need to enter into/perform a contract with the data subject;
- authorization by EU/Member State law providing suitable safeguards for individuals;
- explicit consent.

Consent can be withdrawn at any time and is therefore inappropriate for student assessment purposes. The education is also a strictly state-regulated system where contract principles do not apply. Hence, the best approach is to regulate any AIDM in educational process by law on EU/Member State level. Any legislation authorizing AIDM in education should observe the minimum safeguards prescribed by GDPR (Art. 22(3)), namely the right of the affected individual (i) to obtain human intervention from the controller, (ii) to express own point of view and (iii) to contest the decision. This will mean that schools and universities applying AIDM need to ensure a human teacher for reviewing and, if necessary – for revising the respective assessment and for changing the student's grade. Lastly, applying AIDM will most likely trigger additional GDPR obligations for the controller, including:

- conducting data protection impact assessment (Art. 35(3)(a)), and eventually – prior consultation with a data protection supervisory authority (Art. 36);
- obligation to appoint a data protection officer as the core activities of the controller would consist of processing which requires regular and systematic monitoring of data subjects on a large scale (Art. 37(1)(b)).

## 4. Transparency and Right to Information

Transparency being one of the foundations the EU legal system is based on is related to creating trust in the processes affecting the citizens by enabling them to understand, and if necessary, to challenge these processes [8]. GDPR envisages the transparency along with lawfulness and fairness as one of the main data processing principles (Art. 5(1)(a)) empowering individuals to hold data controllers and processors accountable and to exercise control over their personal data [8].

The most important manifestation of the transparency principle is the right of data subjects to receive and the correlative obligation of controllers to provide appropriate information about personal data processing. The content of this information is strictly prescribed by law (Art. 13-14 of GDPR) and includes practically all the important aspects

of data processing – purposes, legal grounds for the processing, retention periods, data recipients, individuals' rights, etc.

In practice, the adherence to this legal requirement is ensured via a special document prepared by the controller (privacy policy, privacy notice, etc.) containing the relevant information. GDPR introduces multiple requirements on how this information should be presented for utilizing its usefulness for the ordinary citizen (Art. 12). In a nutshell, the information should be presented in a concise, transparent, intelligible and easily accessible form, using clear and plain language, thus avoiding any complex legal and IT jargons, in writing (or by other means, incl. electronically) and free of charge. A higher level of diligence is required when adapting this information for children which affects the educational process. As per the best EU practices, controllers informing children about the processing should *"ensure that the vocabulary, tone and style of the language used is appropriate to and resonates with children so that the child addressee of the information recognizes that the message/information is being directed at them"* [8]. The "UN Convention on the Rights of the Child in Child Friendly Language" is recommended as a good example for child-oriented language [8].

In that respect, kindergartens and schools should implement easily understandable privacy notices describing the data processing in the educational process and, if conducting video surveillance – place warning signs for it. A careful balance between the comprehensiveness and the intelligibility of the information needs to be achieved. To ensure accountability, reasonable solutions seem:

- to place the video surveillance warning signs at the entrances of the surveilled premises and in the security rooms of these facilities;
- to attach the privacy notices on paper at visible places (e.g., at the entrances, near the teacher/director department, at the bulletin board, etc.);
- to place this information on the institution's website – this should be only an additional channel for presenting the information, because not every student has access to a computer and the Internet. Therefore, it should not replace the paper-based approach for informing the students on premises.

## 5. Conclusion

New technologies create new opportunities – for society in general and for specific sectors such as education. The 21st century education is based on ICT, but the key to successful digitalization is adherence to the EU privacy standards. Ensuring data protection compliance in education is an interdisciplinary effort and requires cooperation from all the stakeholders – legal and IT experts, state bodies, teachers, educational institutions, parents, students. Only by combining the advantages of ICT and subjecting them to the rule of law can the ultimate purpose of education be achieved – to prepare the next generations for a better tomorrow.

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# Redefining Education during a Global Pandemic

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### Abstract

*During times of global uncertainty, the demand for innovative language learning and teaching across the globe must be stepped up and at the forefront of educational endeavours. The challenges and formidable impact of the global COVID-19 pandemic has stretched educational systems throughout the world to reassess their goals as students and educators are asked to teach and learn from home while distancing themselves from others. Online teaching experts offer advice on designing support for students and point out resources to assist in the transition to remote teaching [1]. Educational technology significantly contributes to accessible education and the opportunity to design support for students. This presentation/publication focuses on strategies and resources to reinvigorate knowledge and language learning acknowledging that online learning is tantamount to helping our students learn. Examples of research-based strategies are provided to strengthen lesson design, pedagogical input, and expand the knowledge of creative resources. By engaging students in innovative ways, they are able to incorporate essential content and learning is achieved. Creative examples are provided focusing on:*
  1) *Connecting with all students;*
  2) *Addressing the challenges of remote learning;*
  3) *Web-based resources;*
  4) *Ways to keep students motivated and challenged to high ideals.*

*Keywords: online learning, educational technology, pandemic*

## 1. Introduction

The uncertainty of a global pandemic that is constantly changing as we look for hope and answers impacts every citizen of our world. The numbers are skyrocketing and it is estimated that over 300 million students worldwide are experiencing an education disrupted by the spread of Coronavirus [2]. In China, 260 million children began taking their classes online after the Lunar New Year and this type of disruption bridging geographic teaching quality and wealth disparities has an impact that schools and universities will grapple with for a considerable period of time [3]. We must embrace new insights and take advantage of educational approaches offered in the online setting when schools close and face-to-face instruction is no longer an option so that students can explore and expand their acquisition of knowledge as we move courses online. The design and sequence of content and learning activities in both realms should be methodical, systematic and purposeful according to F. Darby [4]. As we commit to continuous improvement and redesign our lessons to meet the current needs of students, the opportunity is afforded to increase learning. This does not mean that students must feel isolated as if they are working in silos, and we can strengthen the curriculum by designing lessons that connect students online through discussions and

groups activities. The concern that many of us must address relates to the students and schools that do not have the technology required to serve students. Some students do not have the resources to purchase the technology required for online learning. By engaging a community of learners in online teaching and learning that integrates content and language learning, students will be motivated to continue their learning in an online format as they deal with the challenges of a global pandemic.

## 2. Making Connections with All Students

Dedicated educators are committed to reaching out and connecting with students.

Fortunately, during this technological age, we have the ability to pursue a variety of online tools and strategies to continue providing a quality educational experience for all students and pursue best practices in the virtual environment. There are numerous learning experiences, resources and strategies for education that can occur remotely.

This will require innovation and resourcefulness on behalf of all of those who are challenged with providing, supporting and receiving an education in the home environment. Educators at the university level are employing a variety of online strategies and tools i.e., Blackboard Collaborate to provide a virtual classroom environment that will challenge students and offer opportunities for group activities and discussion. They follow up with announcements and email to strengthen course learning activities and assignments. For example, university biology professors utilize textbooks that include online versions such as *Mastering Biology*, a teaching and learning platform that empowers them to reach students virtually (M. Caspary, personal communication, May 5, 2020).

In public schools in the United States, zoom video communication platform is used with first grade students to support extended school closures. This enables them to meet virtually and keep up particularly with reading and mathematics programs. Another program called i-Ready, an online assessment and instruction program, is utilized that helps teachers provide all students a path to proficiency and growth in reading and mathematics [5]. This program is available in both English and Spanish to assist young learners. Teachers are also utilizing Google Meet to collaborate and reach students to share and read aloud. There is a concern for those students who may not have the online resources and capability to participate. In Clarke County, Georgia, these concerns are addressed by ensuring that students have access to internet providers and free hotspots to connect. The school website is active and distance learning links are available. To further address access issues, paper packets were designed for students and placed in bins so that they could be picked up by parents without exposure and within the confines of social distancing regulations. Furthermore, meal services were continued and opportunities for disadvantaged students to access the breakfast and lunch service that the schools were providing. (A. Pierson, personal communication, May 6, 2020).

Particular concern has been expressed for English Language Learners (ELLs) who are faced with the challenges of learning English and simultaneously shifting to online instruction. Not only do these students, but also their parents need clear and specific guidelines regarding the information and opportunities to strengthen their English skills and fully participate in the educational experience. Often translation of written communication in a variety of languages is needed to guide students in accessing technology and participate in remote learning. There are systems in place that are designed to assist non-English speaking parents that will remain active when schools reopen [6].

## 3. Addressing the Challenges of Remote Learning

Covid-19 has created a digital divide that has left millions at a disadvantage and the internet is assuming a critical role in communicating with our students [7]. Those students living in poverty are at an increased risk and often do not have the means to access the digital resources that other students take for granted. As unprecedented experiences abound in the realm of online education, many teachers are unprepared to transition their classes to meet with the expectations of the digital age. At Boise State University, procedures are in place and assistance is provided by the Division of Extended Studies to assist professors to leverage their expertise and transition their courses to an online format. In this way they can expand their boundaries and ensure that students are connected to the university and their academic endeavours. The university "Help Desk" is available to professors and students who need assistance or guidance tackling the challenges of online learning.

Students at the high school level described the challenges of virtual learning in a variety of ways. The school year ended early for these students and, because some students chose not to do their work online, grades were calculated based on the scores earned prior to school closures. One exception to this is the Advanced Placement Government class where the teacher has gone out of her way to ensure that students are well-prepared to take this high-stake exam. The format has changed to open book essay questions since students must take the exam from home. The teacher has provided notes and comprehensive information for students to learn and access during the exam including test preparation materials, court cases to learn, vocabulary and government amendments to study. (E. Poucher, personal communication, May 5, 2020).

Students in another high school utilized "its learning" which has prepared a Starter Kit to support schools and teachers to transition smoothly to remote learning. These solutions have been compiled from best practices from schools that have already implemented online learning. (A. Caspary, personal communication, May 5, 2020). Both of these students interviewed explained that they are also meeting the challenges of remote learning by taking Driver's Education courses online and practicing driving with their parents.

## 4. Web-based Resources

Depending on the grade and ability level, numerous web resources are contributing to the remote educational experiences that are facing us during this pandemic. The most common platforms that were mentioned were Google Meetings, Zoom, and Blackboard.

During an interview with a sixth grade (age 11) student attending a private academy, the lessons were well-organized focusing on specific class meetings daily accompanied by homework assignments, video calls, group work and discussions. Teachers posted specific assignments in Google Classroom, a free service for schools, students and parents. Chromebook powered by Google was utilized and links to various web sites, videos and follow up questions were the expectation (S. Poucher, personal communication, May 4, 2020). Students in the private academy still had meeting times arranged for art and music. A favourite is the TED-Ed project – TED's education initiative – makes short video lessons worth sharing, aimed at educators and students. Within TED-Ed's growing library of lessons, are carefully curated educational videos, many of which are collaborations between educators and animators nominated through the TED-Ed platform [8]. Throughout the series of interviews with educators and students, it became evident that the student at the private academy was expected to do far more comprehensive work than those students in the public-school setting.

## 5. Ways to Keep Students Motivated and Challenged to High Ideals

Dedicated educators are sincerely making every effort to engage and challenge their students. They genuinely want to stay connected being available and responsive to the needs of their students encouraging and supporting them as education is making a rapid transformation to never imagined lengths. Student learning at home within the confines of social distancing is a new experience for all of us and the Covid-19 pandemic has sent us reeling to be connected, flexible and collaborative in the face of adversity. In an interview with a student in the fourth grade (age 10), he explained that his teacher made an effort to call on the phone and email him personally. She sent links to engaging material and games such as Wizard Prodigy math game. He explained that websites let you see your score and his teacher lets him know his progress. However, a concern is that the work being assigned is too easy and the advanced students are not receiving the extra work that they prefer. Only English Language Arts (ELA) and mathematics are being covered online and other courses are not addressed (E. Caspary, personal communication, May 5, 2020). Experienced educators in Hong Kong and Italy who faced the challenges of this epidemic before it strongly impacted the United States suggested that reduced assignments were beneficial and urged everyone to be flexible and optimistic [9]. As the challenges continue to mount, expert educators are rising to the occasion by employing innovative strategies expanded to connect their students as they make a concerted effort to provide quality activities, resources and educational experiences designed to positively impact their students.

## 6. Conclusions and Recommendations

The fast-changing educational environment of the Covid-19 global pandemic is an unprecedented experience for educators and students. The opportunity to address the myriad challenges that we are faced with and provide a quality education for all students incorporating technology and innovative strategies for online learning in order to meet the multifaceted needs of our students requires us to revolutionize the learning experience and carefully address the numerous dimensions yielded by these profound changes. As we face the numerous dimensions of this pandemic and its impact on all levels of education, we must rise to the challenge and incorporate technology in various forms coupled with the human factors that affect student growth and achievement.

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# Sharing Is Caring: A Proposal for the Development of Shared, Semi-Autonomous, Mobile FabLabs to Overcome Obstacles in STEAM Education

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## Abstract

*This research originates from previous studies addressing challenges in STEAM education, respectively a lack of knowledge in sciences and mathematics, but also in technology usage and creative skills [1]. We encounter these deficits in university education but are confident that the source of the problem lies in primary and secondary school education. Therefore, we propose a methodology based on the development of novel digital fabrication laboratories, that intend to assist schools to overcome the obstacles associated with STEAM education, due to a lack of technological resources, knowledge, facilities, and appropriate curricular methods. Our previous research already demonstrated the immense effect of digital fabrication technologies onto the ability of undergraduate university students to cope with STEAM related topics. Without a doubt have we seen a very positive impact of these technologies onto the quality of their works, but we also observed a very positive change in their self-esteem, as well as a more positive attitude toward learning. However, the integration of the methodology as a guarantor for successful university STEAM education simply happens too late in time. To be at the forefront of technological advancement, the integration must occur during school education, and must start as early as primary school, with a focus indeed in secondary school. This is challenging since in most cases the regular curriculum is not designed to cater knowledge transfer in these areas, the schools cannot afford the necessary infrastructure, and schoolteachers are not qualified to teach in these domains. Our proposal addresses these issues by changing the way knowledge is transferred (blended and extracurricular instead of frontal instruction) in a non-standard classroom environment with an emphasis on "making". By giving many schools access to mobile hi-tech manufacturing devices situated in a mobile building, that come at zero investment costs for the schools, and at low investment costs for the ministries with a maximum degree of capacity utilization, and by integrating pedagogical approaches that are supported by new algorithms for autonomous, mobile learning.*

*Keywords: STEAM Education, Digital Fabrication, Semi-Autonomous Learning*

## 1. Preamble

The influence of the Covid-19 pandemic onto K-12 education, has shed a new light onto pedagogical research. Our work is not exempt from the fact that the response of many schools around the world toward the challenges of online learning has often been rather dilettantish. We have seen many schools that desperately tried to follow the given curriculum, adopting frontal teaching methods, and transferring them unchanged into the digital realm. We have seen teachers that prepared online content for self-learning without noticing that they entirely disregarded their important role as a mediator in the

classroom, a person that a student connects to, not only as a transmitter of knowledge, but also on a personal basis, as "tutors, mentors or role models" [2]. We have also seen approaches where schools obviously forgot about their obligation to teach. Instead they changed their role into something where teachers solely handed out assignments to check upon knowledge the school has never conveyed to the students. We have seen parents that have been forced to take over the role of teachers, which led them into situations where their obligations as mums and dads conflicted with the new responsibilities. Responsibilities they have never asked for, and never been prepared for. We have seen that schools partially came to a standstill regarding their approach to deliver quality education through new means of online teaching. A deep misunderstanding amongst the teachers what online education must entail is evident.

We have also experienced, that teachers had a very limited understanding for the actual situation of the students at home. Teaching happened entirely uncoupled from the stressful situation the students were facing. The way students were – and still are – taught often leads them to be demotivated, sad, and spiritless. The schools took away the joy out of learning, and the impact of this is way more far-reaching than trying to keep up with the mandated curriculum. It became evident that many teachers have deficits explaining matters, they use pre-defined online content that is partially erroneous, they do not answer questions or address concerns, and if they do, they simply defend themselves, but are not open for constructive critique. And for the students, every single day is the same. The slides look the same, the teacher's approaches are the same, and the boring matters are the same. With very few exceptions, there is almost no real interaction with the students, and parents are left to explain what the teachers should have discussed with their classes. The school closure took away the social interaction students enjoyed every day with their peers, and the teachers missed this opportunity to reintegrate interaction into the online classes. In summary, online education around the world has been a disaster for many, but it has also been an eye-opener for those that were under the mistaken impression that education is in good shape. Those are the ones that are worried now. They are worried about the time after the virus, where students go back to school, and face the problems that are so obvious.

## 2. Introduction

A lack of knowledge in sciences and mathematics, but also in technology usage and creative skills manifest challenges in STEAM education that we encounter in university education today. However, the source of the problem lies in primary and secondary school education. With the experiences made in the past few month, when many schools around the word transferred their classrooms into the digital realm, a lot more aspects became apparent that influence the lack of knowledge in the aforementioned areas. To overcome some of the obstacles associated with STEAM education the following need to be addressed:
- a lack of appropriate curricular methods
- a lack of awareness for global trends
- a lack of facilities
- a lack of technological resources
- a lack of knowledge

As a response to the experiences made in the recent past, aspects that were previously taken for granted need to be reconsidered. K-12 education suffers from underqualified teachers, dated curricula, and more than ever a lack of passion, excitement, and curiosity on both sides, teachers, and students.

## 3. Obstacles

### *Dated Curricula*

Many schools around the world follow predefined curricula that appear to be set in stone. It is almost sarcastic, but even a pandemic cannot touch the omnipresence of a dated idea that a student must learn a certain topic at a certain time. Neither sooner, nor later. No matter what the actual situation is. It is even worse that occurrences in the real world or things that happen in the classroom often have no effect on what is being taught.

Again, simply because teachers feel obliged to teach what they have been told. The pressure that is on the teacher often derives from the pressure external parties put on the school. A school that adjusts teaching to the needs of the students is hard to find.

Negligence of Global Trends.

It is paradox, but teachers are often underqualified. Those that are responsible to shape a new generation of learners, thinkers, makers, and leaders, suffer from an education that is as dated as most of the curriculum is. Even though schools have gone through many reforms in the past, the general understanding of what is important as opposed to what is not, hasn't changed. This is even more astonishing as global trends occurring in the professional world are neglected. Competencies that suit job profiles and requirements of 21st century industries are hardly being addressed in K-12 education. Scenarios of how the curriculum must adopt to these challenges are not implemented [3].

### *Lack of Appropriate Facilities*

It goes without saying that the facilities of today's schools are oriented toward the requirements of dated curricula. Fifty years ago, when the world was facing the recovery and first upturn after WWII, the schools were bursting with facilities such as joineries and metal workshops to meet the demands of the industrialized world. Nowadays, there are no answers as to how the carpentries of the 21st century schools must look like. Schools built in recent years are lacking all kind of facilities, including workshops that would at least give students a sense for craftsmanship.

Technological Resources and their Provision and Use.

With no workshops being built anymore, the amount of technological resources available is also limited. Most schools have resources such as computers, chemical or biological samples, which are all stored in dedicated spaces, and this is the crux with this kind of thinking. In today's world the borderlines between the disciplines diminish, the employee of today and tomorrow has a multitude of transdisciplinary skills that cannot be assigned to a single discipline only. Concepts such as FabLabs or Makerspaces that are already common in many public spaces, but which do not explicitly belong to any of the well-known disciplines, do not have a home in today's school.

Stagnation in Knowledge and Adaptability.

Teachers are detached from the real world. The general education they went through does not leave a lot of leeway for the accumulation of expert knowledge, that is necessary to address the challenges of a globally networked work infrastructure.

FabLabs or Makerspaces would require a different teacher. One that feels responsible. Today, no-one feels responsible. It is neither the arts teachers, nor the physicist, nor the chemist that would occupy such a space. But unfortunately, this are the kind of teachers our schools employ. There is no all-rounder, no person that didn't make it in school, left university, but became a successful businessman anyways, there is no entrepreneur who failed multiple times but stood up again and again because he learned the lesson from the mistakes he made. Our schools are an assortment of individuals that are oriented toward the past, not the future.

In summary, the challenges that successful STEAM education faces are curricula that are not designed to cater knowledge transfer in these respective areas, schools that cannot provide the necessary infrastructure, and teachers that are not qualified to teach in these domains. We must address these problem domains by changing the way knowledge is transferred (blended and extracurricular instead of frontal instruction), in non-standard classroom environments with an emphasis on making and experimentation. We suggest to give many schools access to mobile hi-tech manufacturing devices situated in mobile buildings, that come at zero investment costs for the schools, and at low investment costs for the ministries with a maximum degree of capacity utilization, and we suggest integrating pedagogical approaches that are supported by new algorithms for autonomous, mobile learning.

## 4. FabLabs as an Opportunity to Address STEAM Education

The "Zayed University Research Center for Digital Fabrication" is a transdisciplinary research space within which we address the educational challenges and questions that arise from the use of innovative fabrication technologies representing all aspects of STEAM education. Our research results already demonstrate an immense impact of these technologies onto the quality of works produced by university students, and we derived answers from these results that aid us to adjust the direction of current and future university curricula. Without a doubt have we encountered a very positive impact of digital fabrication technology onto these students. Not only is it that the quality of their works improved, but we also observed a very positive change in their self-esteem, as well as a more positive attitude toward learning. However, the integration of the methodology as a guarantor for successful university STEAM education simply happens too late in time. To be at the forefront of technological advancement, the integration must occur during school education [4], and can start as early as primary school, with a focus indeed in secondary school. As a Research Center that caters the needs of a variety of academic disciplines, we also began to open our labs to students from Secondary Schools. The results we gained from workshops with 12-14 years old students matched the results of the university students regarding the pedagogical impact these techniques have. Students were engaged, motivated, and excited. They understood that the objective of the one-day workshops was to produce an object, for which they had to understand how to digitally fabricate the artefact and assemble it manually. A good combination of different techniques had to be tested and applied. Mathematical formulae had been used for a reason, not as a meaningless assignment on paper. Co-working skills had to be developed and honed. Leadership skills evolved naturally from the student's building an understanding that a group of a dozen students needs guidance.

For suchlike scenarios to happen in schools, a range of theses have been developed by the authors [1] that describe the potential challenges university education must deal with. The situation in most K-12 schools is similar but can be extended with the following theses.

Thesis 1: Digital Fabrication is an expensive undertaking. Only few schools can afford this investment. Often, the devices are not used at their maximum capacity. Thus, a shared infrastructure is a valuable alternative.

Thesis 2: A shared infrastructure that is used to its full capacity is an asset with a very high Return of Investment. Thus, sharing is a valuable alternative to an expensive but underused investment.

Thesis 3: It makes no sense to maintain an underused infrastructure. Therefore, either new users must be brought to the infrastructure, or the infrastructure must be brought to the users.

Thesis 4: Digital Fabrication requires expert knowledge that teachers at school can barely provide. Often, the curriculum does not even allow for these methods to be implemented. Therefore, teachers must be supported with appropriate means through which knowledge transfer can be accomplished. Alternative methods of instruction need to be developed.

Thesis 5: Students have a natural curiosity for the unknown. They are also attracted by technology. Therefore, a classroom environment that challenges the existing and is packed with technology will make them interested to explore.

The theses build the framework for the constitution of mobile FabLabs. They derive from more than half a decade of experience with the development of in situ labs. They inform the devices and tools we will integrate into the various systems, i.e., the mobile architecture, fabrication devices, educational technology, and support systems.
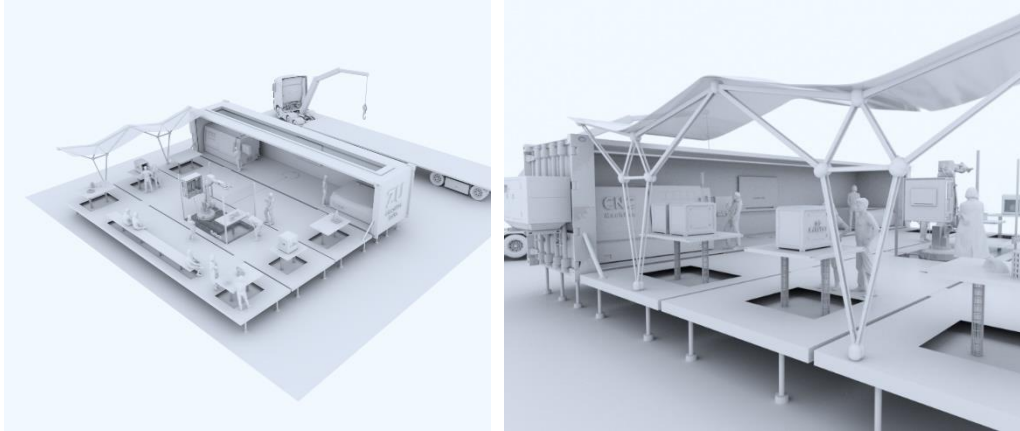
## 5. Shared, Semi-Autonomous, Mobile FabLabs

We propose the development of fully-fledged mobile digital fabrication laboratories that entail novel pedagogical approaches. Once a lab is built, it can be put on a truck, and the lab and the assigned pedagogy can be made available to schools. All elements of the prototype lab are situated in a standard shipping container, and thus can be brought from school to school to be used for a certain period. The container is simply the package that contains all assembly parts, it is not the lab itself. The lab develops through a kinetic structure that can unfold from the container and turn into a fully equipped classroom, with devices that can be pulled out from the container and used in this classroom environment. The mobile lab is ideally located on a school's parking lot. Thus, enabling schools to train pupils in technologies that they otherwise would never be able to work with, because they simply cannot afford. The pedagogy to be developed enables schools to run the lab with minimal effort and knowledge. Algorithms for autonomous learning will aid students concentrate on the fabrication tasks. These labs intend to raise an awareness and create an interest, a curiosity, in the use of technology. It will be evaluated regarding the effect it has on teachers and students. It is a catalyst that intends to boost STEAM education at K-12 institutions of all ages.

The Architecture consists of a structure that unfolds and turns into a completely autonomous, self-sustained classroom. It comprises of lightweight fabrication devices that can be pulled from the container, used in the temporary environment, and operated through simple means. The Engineering of the device infrastructure with its supply systems will allow for easy and safe operation. The Pedagogy will allow students to learn, create, and successfully develop the anticipated skills and abilities in STEAM. It is based on the design of learning experiences that are student-centered, interactive, promote student autonomy, creativity, collaboration, and real-world engagement. Students will learn how to fabricate artefacts through simple digital means and with minimal effort. The method will enable them to generate objects and develop services they can potentially bring to the market at school age. The pedagogy to support the individual student and teacher in their learning process is aided through means of Digital Technology.

Algorithms will be developed to generate software solutions for autonomous Machine Learning through Artificial Intelligence.

The methodology can be described as supplemental (if not disruptive) toward regular course offers. Students are taken out of their regular classroom environment, being confronted with an almost autonomous setting that requires them to actively engage to produce results. Technological systems aid them in this process, making use of their native language (amongst others), producing results that can be touched and taken home.

The students learning progress is manifested in these outcomes. No grade given for any suchlike task is proof of the achievement, but the artefact produced by the student itself.



*Fig. 1. Prototypical Visualization of a Shared, Semi-Autonomous, Mobile FabLab*

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# Tele-mentoring: Taking Learning Global

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## Abstract

*Tele-mentoring transcends the boundaries of time and space. This online mentoring practice partners learners with subject matter experts from around the world. Learning can occur synchronously or asynchronously. The flexibility of time is one of the benefits of this practice. Best practices in tele-mentoring will be discussed. Some of the practices to be discussed include preparing the tele-mentoring to effectively engage with the tele-protégé, frequency of communication, and promoting a personal presence. Both tele-mentoring research along with experiential practice will be examined. Examples from all levels of learning across schools and professional workplaces will be shown. The various models of tele-mentoring will be discussed. Tele-mentoring is a rich learning partnership that benefits the telementor and the tele-protégé. Tele-mentoring brings specific benefits including personalized learning, deeper learning, flexibility, and creativity. The world becomes the classroom when tele-mentoring is engaged.*

*Keywords: Tele-mentoring, online mentoring, e-mentoring, online learning, global education*

## Introduction

Tele-mentoring is online mentoring. It is based on traditional mentoring. One of the advantages of tele-mentoring is that learning can occur at any time and any place. It transcends the boundaries of time and space [9, 13] This allows for experts and learners to interface with each other at times that are convenient to all. No longer are learners bound to a physical locality. Learning is global with the expertise of the world at your fingertips.

## Overview of Tele-mentoring

The practice of tele-mentoring promotes the use of individualized learning that is highly relevant for the tele-protégé's needs. The online communication, whether by email or video-conferencing, allows for telementors and tele-protégés to engage in learning at times that are convenient for them.

Tele-mentoring involves a subject matter expert (SME) known as the telementor and the learner known as the tele-protégé [8]. The tele-mentoring partnership has a number of elements in order to be successful.

One of the most essential elements is creating relationships. This connectivity is a great motivator for learning [10]. Sharing relevant personal information is one way to start building the tele-mentoring relationship and helping both the telementor and the tele-protégé to feel comfortable [3].

Tele-mentoring works best with a project or a specific task [5]. Depending on the project or task along with the age and needs of the learner, the specific model can be selected [6]. Some of the models include whole group, small groups, and one-to-one.

## Role of the Telementor

A telementor's role is that of facilitator, guide, and coach. The telementor needs to ask guiding questions, invite deep thinking, and encourage the tele-protégé to actively engage in the partnership [4, 7]. Preparation is an important element to consider in order to have a successful tele-mentoring partnership. Part of this preparation includes informing the telementor of the goals of the project, the project's duration, along with the frequency of communication [10].

Feedback is part of the tele-mentoring process. Telementors need to provide timely feedback that helps to move the project forward and help the growth of learning for the tele-protégé [10]. The relevant and age-appropriate feedback that is needed may be an area that requires guidance in the preparation phase. The educator may need to provide explicit information that helps the telementor to be successful in their role.

## Tele-mentoring in P-12 Education

The use of tele-mentoring began in basic education. The sciences were the most widely-used subject area although any subject area works well with this practice. A tenth-grade social studies project was described in a tele-mentoring study [4]. The project was titled "Tracking Canada's Past". This project involved students from multiples cities for ten weeks. The telementor was a facilitator and asked guiding questions. One tele-protégé investigated a Canadian figure whose ultimate role in history is still debated to this day. With the telementor's guidance, was able to read the historical records and draw her own conclusions based on the evidence.

## Tele-mentoring in Higher Education

One instance of higher education tele-mentoring involved two professors from different colleges within the same major mid-Atlantic American university. In this particular tele-mentoring project, the professors were the telementors and the tele-protégés [11]. This was an interdisciplinary partnership that involved advocacy and educational learning theories. The professors served as telementors in their area of expertise. They were tele-protégés learning alongside their students in the area of learning for their students' projects. A unique feature of this tele-mentoring project was that the students in each class served as telementors for the other class. The exchanges took place mostly asynchronously through the University's Learning Management System. The discussion board was the most frequently used tool to communicate throughout the project. Exchanges were organically-generated by the students (tele-protégés) with very little prompting from the professors (telementors). Both the telementors and tele-protégés showed gains in learning of the subject matter that was the focus for their learning.

## Tele-mentoring in the Workplace

Tele-mentoring plays a role in career and social support in global organizations through tele-mentoring was discussed by [2]. The telementors acted as guides and coaches to help the tele-protégés to navigate situations in their careers. A trusting relationship was found to be an important element. Another benefit was a reduction in "…. the effects of status differences since fewer social cues, and hence less face-to-face social interaction occurs, resulting in increased focus on organizational tasks" [2]. A dynamic global environment needs innovative ideas to sustain the relationship in

mentoring and tele-mentoring helps to achieve this goal [2].

Another area that is rapidly gaining in the use of tele-mentoring is the medical profession. Surgical procedures and training are areas that show the importance of the role of tele-mentoring. The benefits included the ability to access needed experts in real-time in places where face-to-face mentors were not feasible such as in rural areas. The researchers noted that tele-mentoring has the ability to have a strong impact on teaching and sharing new techniques [14].

**Lessons Learned: Tales of a Telementor**

In addition to researching tele-mentoring, this researcher has been a telementor [9].

The experience was enriching and enlightening. The experience provided me with valuable insights into the tele-mentoring experience.

The research guided the tele-mentoring practice. Best practices from the literature were used and proved to be invaluable. In order to make this reflection come alive, the first person will be used.

My tele-protégé sought my expertise in writing. This middle school student wanted to write a play. The original duration of the project was to be six-weeks. This turned into a two-year long tele-mentoring partnership through mutual agreement.

I started our partnership by sharing some relevant information about myself. This helped my tele-protégé to begin to know me as a person. This sharing of personal information offsets a phenomenon which is known as mechanomorphism [12]. This term means that in the absence of personal information, machine-like characteristics are attributed to the person on the other side of a computer-mediated communication.

I clearly communicated goals, expectations, frequency of interaction, and feedback.

It was important to have this clear communication. Along with clarity of communication came frequency of communication. Frequent communication was helpful to keep the project moving along. Time constraints on my part and that of my tele-protégé did necessitate changes to our frequency. Allowing for that flexibility was helpful to both of us.

An important lesson that I learned was of the power of feedback. My questioning invited my tele-protégé to think more critically and in a deeper manner. Specific actions that I offered were helpful and my tele-protégé was free to implement them or suggest other adaptations.

Following the best practices of the tele-mentoring literature helped me to create and sustain a successful tele-mentoring partnership. Adding flexibility and creativity into the experience promoted an enjoyable and enriching time for both myself and my tele-protégé.

**Conclusion**

Tele-mentoring allows learning to connect learners and subject matter experts from around the world. This practice promotes individualized learning that is relevant and meaningful. The relationship that is built between telementor and tele-protégé helps to further the learning that is needed.

The increasing global need for sharing of expertise is met through the use of successful tele-mentoring partnerships. The literature shows the best practices to promote these successful partnerships.

Engage the world with tele-mentoring. Indeed, "The world is our classroom!" [1]. The potential of tele-mentoring is only limited by our imaginations.

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# The Level of Interactivity in a Virtual Reality Learning Environment: A Design Key Factor

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## Abstract

*The increasing use of virtual laboratories (VL) based on virtual reality (VR) in the academic field is associated with the need to constantly evaluate and improve the educational effectiveness of these educational tools. Currently, there are different studies that clarify what factors must be considered when teachers design and implement this type of VLs in their classrooms. In this sense, equipping a VL with the appropriate level of interactivity has been revealed as a key factor to ensure that students learn better the concepts that they are studying and, in addition, they are able to retain them in their memory for longer. This article describes and compares two versions of the same non-immersive VR-based VL that simulates a Rockwell hardness test and that were programmed with different levels of interactivity. Although both VL versions guide the user through the virtual experiment, the first version offers few possibilities of interaction with the virtual environment, while the second VL requires a greater degree of interaction with the virtual elements to perform the experiment. The analysis carried out through the comparison between both VL versions can serve as a guide for teachers when deciding which level of interactivity is the most appropriate for the VL they are developing.*

*Keywords: Virtual reality learning environment, virtual laboratory, materials science and engineering, Rockwell hardness test, interactivity, education*

## 1. Introduction

Virtual reality (VR) has experienced a great expansion in the last decade [1], being nowadays a relatively cheap and easy to acquire technology. VR technology can be materialized in different ways, but the two most widespread are [1]:

- *Non immersive virtual reality (NIVR)*: displays the virtual environment on a screen (e.g., a computer or tablet screen). User interaction with the virtual environment usually relies on a keyboard and mouse, touch screen or control knobs. Most of the video games currently developed for game consoles and computers represent the best-known application of the NIVR.
- *Immersive virtual reality (IVR)*: uses a head-mounted display (HMD), which is a device that places a screen in front of each eye, to visually immerse the user within the virtual environment. The user's interaction within the virtual environment is usually carried out by means of control commands. An example of the use of the IVR is HMD systems like Oculus® or Vive®.

VR technology is already used in many areas such as architecture, industrial plant engineering or medicine, to mention just a few examples. Education is one of the areas where VR is increasingly used [1-3], being virtual laboratories (VLs) the most widely accepted teaching tools among teachers and students [4, 5]. VLs based on VR simulate laboratories in which students can (i) conduct virtual experiments similar to those they would conduct in a real laboratory, and (ii) use some features of virtual environments to enhance the learning of certain concepts. Performing experiments in a VL instead of a real laboratory has advantages such as cost reduction or elimination of hazards associated with the use of machinery or toxic products, among others [4].

VLs using VR have proven to have great potential in supporting teaching. For this reason, in recent years research has been conducted into the methodology to be followed in all phases of the VL life cycle in order to achieve a high degree of training efficiency [2, 6]: design, development, classroom use, evaluation, and improvement.

Several studies [2-7] indicate that the level of interactivity with which a VL is programmed has a decisive influence on the difficulties that students encounter during learning and on the knowledge, retention rates after instruction. Therefore, when designing a virtual reality-based VL, the way in which users will interact with the virtual environment must be carefully analysed to ensure that the educational objectives are achieved.

This paper compares two versions of the same VL using NIVR to simulate a Materials Science and Engineering (MSE) laboratory where a Rockwell hardness test is performed [7, 8]. However, to carry out the virtual experiment in the first VL version [7] a control system with a very low level of interactivity is used, while in the second version a control system that requires a higher degree of interaction between the user and the virtual environment is used. The comparative analysis allows us to identify which educational objectives can be achieved with each VL version and, therefore, which situations would call for the use of one over the other. In this way, this study can serve as a reference for teachers who design similar tools to establish how they want their students to interact with the VL.

## 2. Description of the Virtual Laboratory

The VL recreates an MSE laboratory similar to that found in any engineering school (Figure 1). On a laboratory table there is a CENTAUR RB2 hardness tester, which is used in the VL to perform Rockwell hardness tests in two different scales (RH-B and RH-C) [7]. The application runs on a personal computer and the interaction between the user and the virtual environment is carried out using a keyboard and a mouse. The VL allows users to move freely around the virtual lab and explore the Rockwell hardness tester from different angles in order to become familiar with it, after which the virtual experiment starts. A final exercise puts an end to the experiment.
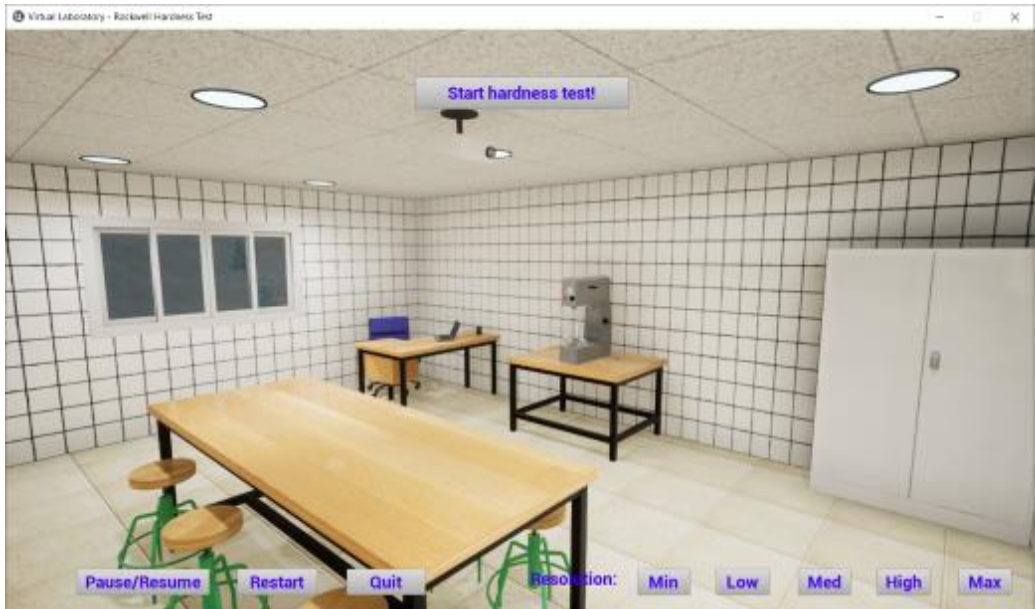
*Fig. 1. General view of the virtual laboratory where durometer is placed
in a central position*

However, once the experiment has started, users' interaction with the VL is different in each of the versions:

- In the first version [7] the user is asked to press a certain key on the keyboard to perform the next step of the experiment (Fig. 2). Once the requested key has been pressed, an (automatic) animation shows how that step is performed without the user intervening again. Then, when the animation is complete, the VL requires the user to press another key to activate the animation for the next step of the experiment. This mode of interaction is similar to showing an animation that teaches how to perform an experiment but is automatically paused before starting a new action that is important for the experiment.
- In the second version [8], when a new step of the experiment is to be started, the user is asked to click directly on certain virtual elements with the mouse (Fig. 3) or, on other occasions, he/she is asked to click on on-screen buttons. When the user performs the action requested by the VL, animations are activated showing the result of such actions. As an example, the test tube is put on the holder when the user clicks on it. Then, the user is required to click repeatedly on certain handles until the test tube is situated near the indenter.

*Fig. 2. First version of the VL asking user to press "I" keyboard key to insert indenter*
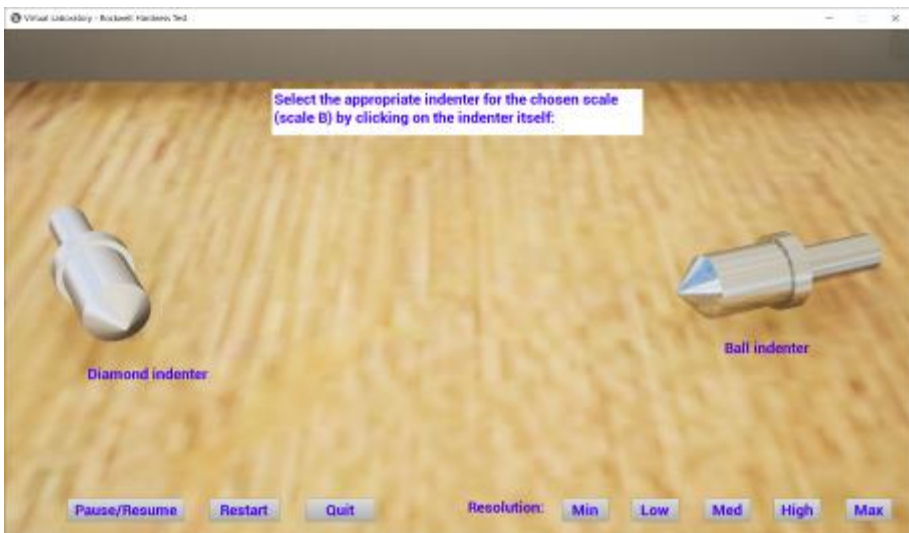


*Fig. 3. Second version of the VL asking user to click on the appropriate indenter to insert it.*

### 3. Comparative Analysis

The VL described above aims to teach students how to conduct an experiment. For this reason, in both versions a step-by-step system is used to guide users in the performance of the virtual experiment [2], thereby improving the level of meaningful learning. However, as seen above, the way in which users interact with the VL throughout the experiment differs substantially from one version to the other, a fact that determines the pedagogical objectives that each VL version aims to achieve. It should be noted that the second version was designed with the purpose of improving some shortcomings that were detected when using the first version in the classroom, and which are detailed below.

### 3.1 First Version of the Virtual Laboratory: Lower Interactivity

As noted above, the first VL version (Figure 2) is strongly related to the display of three-dimensional animations. However, when using the VL students do not play a totally passive role as is the case when they just visualize animations. This is because before visualizing a new animation (which corresponds to a new step in the experiment), students must read the information on the screen and press the specific key required.

By doing so, students stay focused during the experiment, which facilitates understanding. This lower level of interactivity allows students to focus exclusively on understanding those concepts intended to be taught through the VL, without having to divert their attention to think about how they should correctly interact with the application (they do not need to identify elements of the virtual environment, just find the key to be pressed on the keyboard at each moment). Conversely, the fact that it is not necessary to identify elements involved in the experiment before moving on to the next step makes it difficult for the student to become familiar with precisely those elements and their manipulation. Thus, this VL version is suitable to be used for the purpose of teaching students about Rockwell hardness testing at a theoretical level, without pursuing the development of the skills required to conduct authentic experimental tasks in a real laboratory. The use of this VL version fits, for example, into MSE lessons where the fundamentals of the different types of existing hardness tests are taught.

### 3.2 Second Version of the Virtual Laboratory: Higher Interactivity

The second VL version (Figure 3) requires students to identify certain elements involved in the experiment and click on them to continue with the virtual experiment.

Students' role is more active here than the role they play using the first version, which helps increase their motivation and the ease in understanding how the experiment is performed. This higher level of interactivity requires higher levels of attention to identify the elements to be clicked on to continue with the experiment. This process helps students have a clear idea of which elements are involved in the completion of the experiment and how such elements should be manipulated at each moment. Conversely, this mode of interaction requires more time and attention from the student to notice how he or she should interact with the application, removing the focus away from the development of the experiment as a whole. The use of this version of the VL is therefore suitable for preparing students – who have already assimilated the theoretical contents – to carry out a Rockwell hardness test in a real laboratory.

### 4. Conclusions

In this article, two versions of the same virtual laboratory (VL) based on virtual reality (VR) have been described, presenting similarities in design (step-by-step protocol that guides users throughout the performance of a virtual experiment) but having different levels of interactivity. The first version of the VL was programmed with a very low level of interactivity, while the second version was equipped with a higher level of interactivity than the first one. The comparative analysis between the two VL versions, based on the authors' in-class experience, allows us to conclude that the level of interactivity of a VL is a design key factor. Thus, several considerations regarding the interactivity level of a VL should be considered: (i) minimum interactivity when aiming to teach general theory about conducting an experiment; or (ii) higher level of interactivity when aiming to enable students to perform a given experiment in a real laboratory.

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# The Promotion of Self-Reflection in Students in Online Education: The Use of Exam Wrapper

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## Abstract

*The ability to self-regulate learning is an important factor in the learning process. Students must be capable to analyse their learning path and know how to adapt their strategies to the demands of the task to achieve success. Our results were obtained from 67 students online, 76.1% female and 23.9% male. Their average age is 37.7. The results point to a primacy in the choice was the reading of the texts of the course in question. These students indicate that they used, on average, about 12.7 hours to prepare the moment of evaluation. Regarding their perception of self-reflection, there was a high consensus regarding promotion to help study habits. They plan to use this methodology in other course units. Our results also point to a positive and significant correlation (95%) between the number of hours of study and the classification they hope to obtain. In conclusion, from the responses obtained, it was found that students understood the purpose of this reflection and that from this they were able to perceive some aspects that should be considered at another time of evaluation. This leads us to believe that this induced self-reflection produced the expected results.*

*Keywords: Online learning, adult students, Learning self-regulation, metacognition*

## 1. Introduction

Online teaching has become an increasing experience for numerous people.

Changes in the social, economic and technological level were in the root of this increase. This led to the need to obtain new skills and/or reformulate old ones, leading individuals to look for ways to fill this need [1]. Online education was the answer found that allows a large number of people to obtain their studies [2]. It clearly has a great advantage over face-to-face teaching due to its flexibility of space, time and pace. The success for a large part of these students, is related to their ability to self-regulate their learning and their metacognitive capacity.

There are several factors converging that make the learning process happen.

Knowing how each one adapts and transforms information into knowledge can help make this process more meaningful. Metacognition is the knowledge about the learning process itself. It is understanding how to learn over a period of time, what strategies to use. It is, therefore, the ability to find, evaluate and use information. These too can be changed over time in order to give a more appropriate response to the learning situation and, thus, ensure a better knowledge of the situations. Metacognitive resources can be developed, improved, adequate and to do that strategies are used to promote this development.

This implies that learners are autonomous and responsible in their own learning process. For Flavell [3], [4], metacognitive knowledge involves three key variables:

1) Self-awareness: The ability to analyses strengths and weaknesses and how to overcome them.
2) Task analysis: It deals with what students know about the task and what they need to do to achieve success.
3) Strategy selection: Here are the problem-solving strategies that allow learners to understand and comprehend new knowledge.

We have, then, that metacognition promotes responsible, self-reflective and knowledgeable learners of their own learning processes in order to be able to exercise control over their apprenticeship. By placing the emphasis on metacognition, we are facilitating lifelong learning. This is because a learner who knows himself as such (his strengths and weaknesses, how his thinking is structured) is better prepared for the learning situations that occur throughout his life. Flavell [3] is considered the founder of the concept of metacognition, which, according to him, involves active monitoring and self-regulation of cognitive processes.

There are ways to help develop this metacognitive ability. Among these techniques are the Exams Wrappers [5]. This type of intervention can help improve students' metacognition. A wrapper exam is a way for students to reflect, in a structured way, on their assessment test and understand the result of their performance [6]. Wrappers exams guide students to reflect on three important components for learning – study skills used, type of mistakes made in the test and the necessary adjustments for future assessments (changes to study habits to better prepare for the next one) evaluation) – Figure.
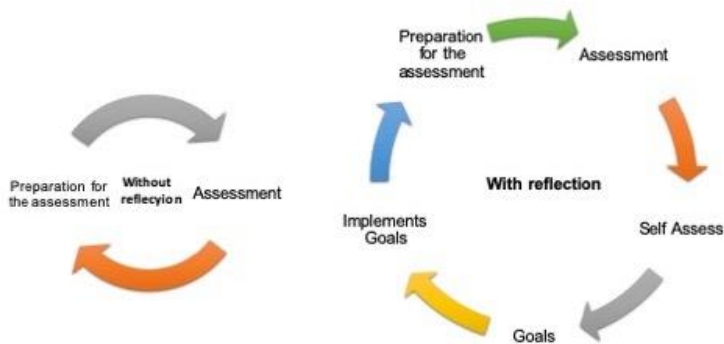


*Fig. 1. Differences between the study with and without reflection*

The implementation of this tool aims to help students to understand their metacognitive skills to take them into account in a future evaluation. Thus, identifying study strategies to improve their classification [7] Pate, Lafitte, Ramachandram and Caldwel [8] refer that, although it is necessary to know the true impact of wrapper exams, they can be used as a way to promote lifelong learning. The recommendations of the study carried out by Gezer-Templeton, *et al.*, [7] go in the same direction when they state that students report, as positive, the use of this type of tool and plan to use it in the future.

## 2. Methods

### 2.1 Research Objectives
Our research's aim was:
a) Determine students' expectation about their grades and time spent preparing to do the assessment;
b) Measure the association between expected grade and time spent preparing for

an assessment;
c) Identify strategies used to prepare for the assessment;
d) Identify students' perceptions regarding a self-reflection exercise and its usefulness to aid studying and, on their grades, and future assessments.

### 2.2 Procedures and Instrument

For the data collection, an Exam Wrapper was built. This consisted of 3 distinct parts.

The first part concerned identification data. The second part was divided into 4 aspects – Classification to obtain, Preparation time, Activities used and changes for the next evaluation period. Finally, the 3rd part perception about this type of self-reflection, with regard to its help to improve study habits, classification and the hypothesis of applying this methodology in other curricular units of the course. We therefore have the following composition:

- How did you prepare the exam?
  - Activities
  - Time
- What changes for the next assessment test?
- What perception about the implications of this type of self-reflection?
  - Study Habits
  - Classification
  - Application in other curricular units.

We used the Exam Wrapper at the moment immediately after the delivery of the first evaluation work and before they know the evaluation. The Exam Wrapper was made available online and the link to it was introduced in the message to students to take it.

All students are studying online, in the 1st and 2nd year. The response to the Exam Wrapper was made voluntarily.

## 3. Results

### 3.1

67 students participated in our study who are studying online. Of these, 76.1% are female and 23.9% are male. Their average age is 37.7 (SD=7.9), with a minimum of 19 and a maximum of 51 years.

### 3.2

We will proceed to the presentation of the data from parts 2 and 3. We will proceed to present the following data.

1. *What evaluation do you expect to get on your A-folio (assessment test A)? (indicate only one number)*

*Table 1. Expected evaluation*

| Average | SD | Mode | N |
|---------|------|------|-----|
| **2.8** | 0.70 | 3.0 | 52 |

We found that these students estimated that, on average, their rating will be 2.8, on a scale of 0 to 4. This question was not answered by 25 students.

The data in table 2 refer to the average preparation time to carry out this assessment.

2. *Approximately, how much time did you spend preparing for this folio* (*assessment test*)? *Please calculate an estimate in hours and do not use intervals*

*Table 2. Hours of preparation for the assessment*

| Missing | Average | Mode | SD | Min. | Max | N |
|---|---|---|---|---|---|---|
| 2 | 12.7 | 8 | 12.8 | 0 | 64 | 65 |

As can be seen, the preparation average time was 12.7 hours, with a wide range between the minimum and maximum time.

We now proceed to present the results obtained from the last question of this group.

It is associated with the learning activities that this group of students used in their preparation for the assessment test (e-folio A). The values obtained are illustrated in the 7 graphs that follow and grouped in Table 3.

*Table 3. Study activities used*

|  | Average | SD |
|---|---|---|
| 2.1. Read the course unit texts | 38.0 | 25.3 |
| 2.2. Consult diagrams and videos | 26.1 | 26.8 |
| 2.3. Review notes | 20.0 | 24.6 |
| 2.4. Make study material: notes/schematics/concept map | 27.5 | 22.8 |
| 2.5. Study in a group or with a friend | 7.8 | 18.7 |
| 2.6. Apply self-questionnaire | 9.8 | 17.0 |
| 2.7. Consult material external to that indicate in the uc | 15.83 | 21.7 |

We found that the activity most used by these students was Read the course unit texts. On the other hand, the least used was Study in a group or with a friend. We also found that there is a wide dispersion in the selection of the various activities.

We now proceed to present the data of the 3rd part regarding the perception of this type of self-reflection. This part consists of 3 questions on a 4-point Likert scale, ranging from strongly agree (4 points) to strongly disagree (1 point). In it, we intended to analyse the extent to which this type of self-reflection can help to improve study habits and, also, their classification. Finally, if you think it is important to apply this reflection to other curricular units in your course. The results are as follows in table 4.

*Table 4. self-reflection*

|  | *This type of self-reflection helps me to improve my study habits* | *This type of self-reflection helps me to improve my ranking* | *I hope to apply this type of self-reflection in my other curricular units* |
|---|---|---|---|
| *Average* | 3.67 | 3.42 | 3.65 |
| *Mode* | 4 | 4 | 4 |
| *SD* | .504 | .655 | ,595 |

From the results obtained, we found that, for these students, this type of self-reflection helps them to improve their study habits and, with that, their classification. This can also be extended to other areas of study.

Finally, we tried to study whether there was a relationship between the number of hours it took to prepare the assessment with the rating they expected to obtain. To make this analysis we used Pearson's correlation coefficient. We can see from the value

obtained by this statistical test that there is a significant positive correlation between the number of hours of preparation and the estimated classification, r=30, p=0.031. Thus, a greater number of hours of preparation is associated with a higher estimated rating.

Finally, analysis of the question *Based on your answers to the previous question, please indicate at least three items that you plan to do differently in preparation for the next assessment*, refer us to the questions of Time, Planning, for more Participation active in the study process, as well as the reinforcement of some forms already used.

*Table 5. New study activities*

| Activities | | Operationalization |
|---|---|---|
| Time Issues | 11 | Spend, manage, ... |
| Planning | 8 | From study, activities, ... |
| Participation (more active) | 7 | In the forums, with a colleague, in a group, ask more questions |
| Form | 21 | Annotations, Concept maps, Schemes, Abstracts, apply self-questionnaires, consult more material, do more research. |

## 4. Conclusion

Lifelong learning has become a constant in today's societies. With this, the growing need for each one to know himself as a learner. Knowing our strengths and weaknesses is important in a learning situation. This self-knowledge, this metacognitive knowledge is a key element in ensuring success. In this sense, it is important to use strategies that help students to promote their metacognition. Wrapper exams are an example of this.

The work of Schuler *et al.*, [6], after using this instrument, points to an improvement in metacognition. The results of Soicher & Gurunk [5] go in the same direction. Our study, just as an intervention, points to a recognition of the importance of such an analysis, as well as its extension to other curricular units. As a future suggestion, we think it is pertinent to use the wrapper exam at all times of assessment, as well as to explore with students their answers, in particular, those related to their study strategies.

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# Virtual Reality to Solve Spatial Vision Problems: An Experience in High School

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## Abstract

*Many students have serious spatial vision problems, and the inability to develop this competence is one of the factors that end up frustrating them in courses where the understanding of three-dimensional concepts is paramount. The Technology course taught in Spanish High Schools is a clear example, since its contents include the explanation of crystallographic lattices, which cause serious spatial comprehension difficulties to many students. Given that it has been proven that virtual reality learning environments can enhance the teaching-learning process, this article evaluates the effectiveness of a Didactic Virtual Tool (DVT) based on virtual reality, which was designed by the authors to increase the visualization capacity of crystallographic lattices. To this end, a real experience with High School students has been carried out. Following this experience, a descriptive research has been conducted through a survey to students, where they are asked about different aspects of the course: (i) user experience; (ii) specific concepts of crystal lattices; (iii) possible improvements in the DVT; and (iv) DVT overall evaluation. The results obtained in this research encourage further progress in the development of such platforms, as students gain improved spatial vision, increased ability to learn and higher motivation.*

*Keywords: Virtual reality, didactic virtual tool, materials science and engineering, spatial comprehension, skills, high school*

## 1. Introduction

Many students have difficulty with spatial visualization of 3D objects, this ability being related to spatial intelligence. The concept of spatial intelligence emerged in the late 1970s with the theory of multiple intelligences [1] and can be defined as the capacity or ability of people to solve spatial problems, visualize objects from different angles and perspectives or recognize faces and scenes. Linked to this type of intelligence is spatial vision, which is the ability to mentally rotate geometric figures. This skill is of great importance to professions such as architecture and engineering [2, 3]. Different studies [4] indicate that spatial visualization is a skill that can be improved through practice and training.

One of the best ways to develop this ability is through virtual tools based on information and communication technologies (ICT), mainly for two reasons: (i) students have a positive attitude towards them [5] and (ii) they offer advantages over other methods [6, 7] by providing interaction with 3D objects [8, 9]. Furthermore, ICT is essential in our society and affects both the way individuals deal with everyday life and the way organizations and companies operate and manage [10]. Taking this into

account, this article evaluates the effectiveness of a new learning paradigm, relying on a Didactic Virtual Tool (DVT), based on virtual reality (VR) technology (Fig. 1), which was designed by the authors to increase the spatial comprehension of crystal lattices [11, 12]. Crystal lattices is a learning standard that students of Technology courses in Spanish High Schools must acquire before starting any higher education related to technical or engineering degrees. To better understand these concepts, spatial vision plays a fundamental role [11-13].



(a)                                                                (b)
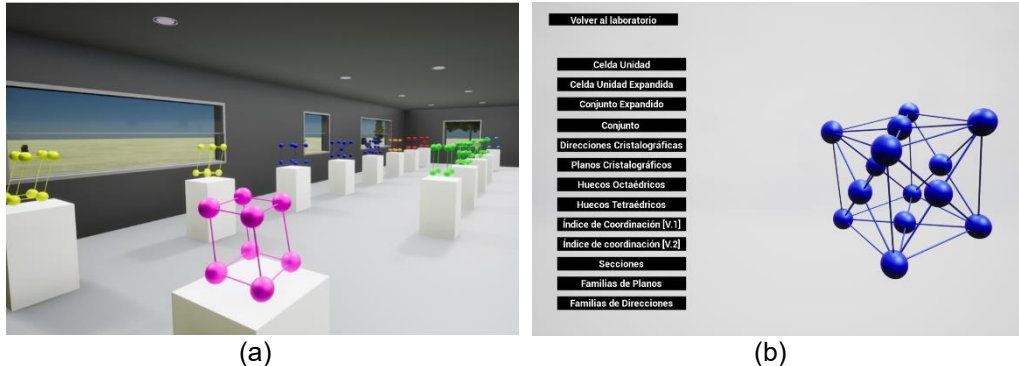
Fig. 1. DVT of crystal lattices [11, 12]: (a) general view; (b) didactic application

## 2. Methodology

### 2.1 Methodological Approach

This descriptive research is part of a real experience developed with High School students (16-17 years old). The methodology process in which this research is grounded is structured in three stages (Fig. 2): (i) *Master class*: the instructor teaches the most important theorical concepts of crystal lattices; (ii) DVT *first experience*: the instructor shows and explains the DVT to the students and thereafter they are allowed to use it; (iii) *Descriptive research*: the instructor gives surveys to students, where they are asked about different aspects of the course.



Fig. 2. Methodology process outline

### 2.2 Survey structure

In order to know and quantify students' opinions about the DVT effectiveness for the learning of crystal lattices, as well as their degree of conformity with it, a survey is designed. In this survey, 10 students answer different questions structured in the following blocks: (i) User experience: questions related to influential aspects in the user-DVT interaction; (ii) Specific concepts of crystal lattices: questions aimed at checking the degree of knowledge about specific concepts of the different crystal structures; (iii) Possible improvements in the DVT: questions to obtain information about potential enhancements to be developed in future platform updates; and (iv) DVT overall evaluation: questions related to the DVT effectiveness as a didactic tool.

## 3. Results

This section shows the survey results. In the first block of questions, user experience, students evaluate technical aspects of the user-DVT interaction (Fig. 3): (i) Question 1 (Q1): difficulty in visualizing 3D objects; (ii) Question 2 (Q2): degree of understanding of the operating instructions of the virtual platform; (iii) Question 3 (Q3): DVT user-friendliness; (iv) Question 4 (Q4): ease of understanding of different crystal lattices; (v) Question 5 (Q5): quantification of problems found when using the DVT; (vi) Question 6 (Q6): degree of students' motivation; and (vii) Question 7 (Q7): degree of usefulness of the DVT graphical interface.



*Fig. 3. Survey results: user experience*
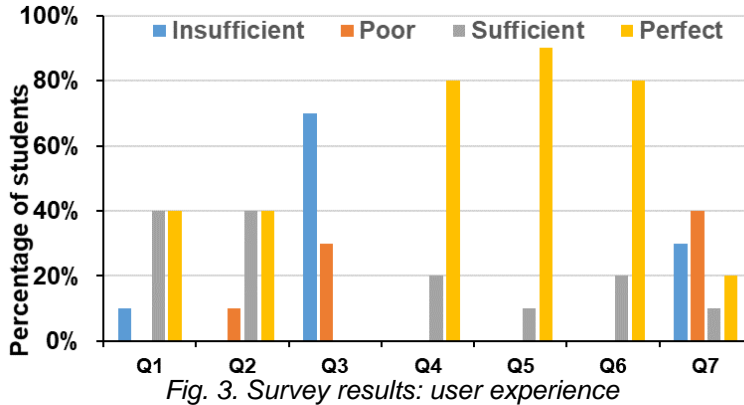
In the second block of the survey students are asked about specific concepts related to the different crystal structures (Figure 4): (i) Question 8 (Q8): spatial vision; (ii) Question 9 (Q9): crystallographic planes, crystallographic directions and coordination index; (iii) Question 10 (Q10): properties of crystal lattices; (iv) Question 11 (Q11): degree of understanding of crystal lattices; (v) Question 12 (Q12): difficulty in understanding different crystal structures before using the DVT.
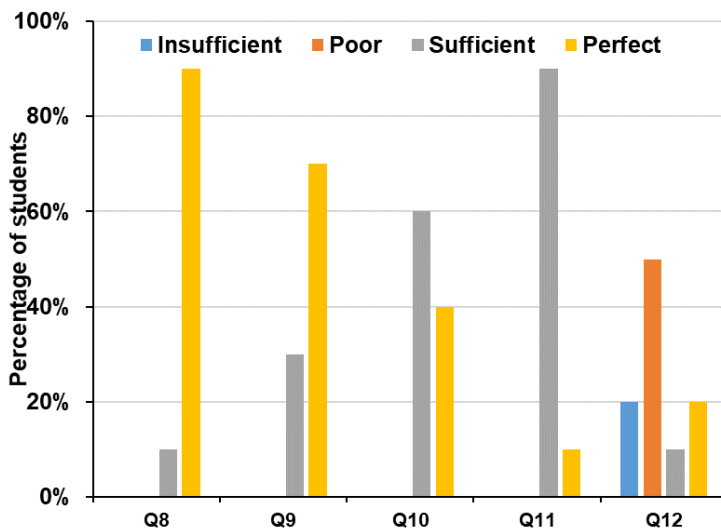


*Fig. 4. Survey results: specific concepts of crystal lattices*

In the third block of the survey, linked with possible improvements in the DVT, students answer yes or no to these questions (Fig. 5): (i) Question 13 (Q13): is this DVT applicable to other subjects?; (ii) Question 14 (Q14): would you make any improvement in the DVT?; and (iii) Question 15 (Q15): can DVTs have other applications? Finally, with regard to DVT overall evaluation, only one question is asked: (i) Question 16 (Q16): is the DVT effective as a teaching tool? (Fig. 6).
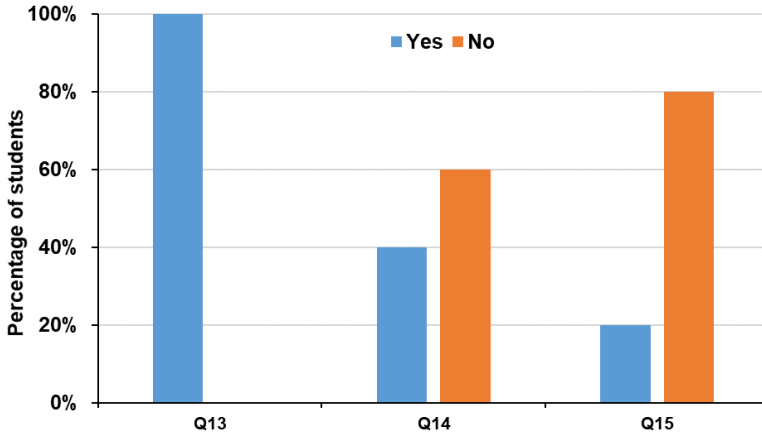


*Fig. 5. Survey results: improvements in the DVT*
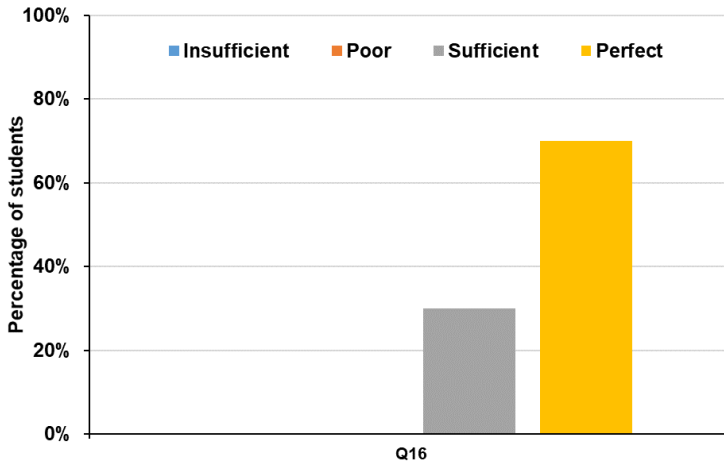


*Fig. 6. Survey results: DVT overall evaluation*

## 4. Conclusions

The results obtained in this study reveal that this virtual reality learning environment designed to reinforce the spatial comprehension of crystal lattices is considered a useful tool by High School students. Thanks to this DVT, students with less developed spatial intelligence can better understand concepts related to crystal systems. Finally, the results obtained encourage further progress in the development of new DVTs with educational purposes.

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# When the Google Generation Meets Academia: Digital Skills of Tomorrow's Students

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## Abstract

*What digital skills do tomorrow's higher education students have? Can we talk about a paradigm shift in skills, knowledge, and learning strategies? This paper is based on extensive data from a national survey on digital practices in primary and secondary education. These students are born and raised in the digital era with smartphones, social media, and online games. However, findings indicate that the twelfth graders seem to be quite traditional when faced with their own learning strategies, as many prefer pen and paper over keyboard and screen. The seventh graders have to a larger extent been trained in using digital learning tools and seem to prefer digital approaches over lectures with pen and papers. There is a notable positive development of digital maturity among students in the last six years. The proportion of twelfth graders that spend their time on non-academic activities on computers in class has halved. Also, reported disturbance from computers in class has decreased for all students. Twelfth graders report extensive use of computers during most of their classes, but they have less use of creative tools than their younger counterparts, e.g., movie editors, animation apps, and computer programming. The twelfth graders will meet academia in 2020, while the seventh graders follow five years later. Different blended learning approaches could motivate and engage tomorrow's students. Lecturing and handwriting seem to be more applicable for the forthcoming students, but more interactive solutions could be needed to engage the ones that enrol higher education in five to eight years from now.*

*Keywords: ICT in education, digital skills, digital natives, blended learning, learning strategies*

## 1. Introduction

It has long been discussed how students are affected by computers and tablets in school. All the time children and young people spend on digital media in their spare time are for some an argument that the school should be a counterweight to the digital [1]. Or conversely, a good digital practice in school is necessary for students to become good digital citizens and acquire the skills and competencies needed in society and working life [2]. Regardless of the different opinions about the school's role, is it obvious that learning by using digital technology has recently become more relevant than ever before, as countries around the world practice digital home-schooling due to the corona pandemic. The purpose of this paper is to address the typical characteristics of Norwegian students' digital practices in lower education. It is based on data from the national survey Monitor 2019 – which was conducted among students in four different grades in K-12 education. In this paper, I will use data from two grades: seventh grade and twelfth grade, to compare students from primary and upper secondary school.

### 1.1 The Norwegian School System

The primary and secondary education and training consist of grades 1-13 for general studies, or grades 1-12 plus to more years as an apprentice when choosing vocational training. Kids start 1st grade in the year of their sixth birthday. Most commonly, the schools are divided into three levels: primary school 1-7 (barneskole), lower secondary school 8-10 (ungdomsskole), and upper secondary school 11-13 (videregående). There are approximately 630,000 students in primary and lower secondary school, and 187,000 students in upper secondary school [3].

## 2. Theoretical Background

In this chapter, I will briefly describe some of the terminology used in this paper. We have many names for the things we love, but a discussion of different conceptions will be sparse due to the paper's premises.

### 2.1 Google Generation

There are several terms to describe the generation that is born and raised in today's digital world. Prensky uses 'digital natives' for the young generation, while those born before the internet are 'digital immigrants' [4]. He claims that digital natives *are all 'native speakers' of the digital language of computers, video games, and the Internet* [4 p. 6].

Rowlands *et al.*, use 'Google generation' about those born after the personal computer became ubiquitous, and those who frequently use the internet as a source of information [5]. At the same time, they point to the fact that 'googling' is something we all do, which makes it somewhat an inaccurate description. Therefore, I want to add an additional element in describing our emerging generation. That is, the way most children and young people have become accustomed to work online. The youngest students are less familiar with concepts like HDD and 'Save As', as they are no longer relevant for a generation that uses cloud-based solutions. Both Google, Microsoft, and Apple have launched cloud-based solution for the education sector. As an example, half of the top ten largest municipalities in Norway have fully or partly implemented G Suite for Education and chrome books for their primary and lower secondary schools. Overall, more than 100,000 students nationwide work cloud-based in Google's solutions [6]. This, in addition to the way many tend to search for information, i.e., 'to google' makes Google generation a descriptive term for young students today.

### 2.2 Digital Skills

In Norwegian curricula, the term 'basic digital skills' is used to describe what students in 1-13th grade should be able to perform as a minimum when it comes to digital skills for learning purposes. Digital skills are among the five basic skills of the Norwegian school system, together with reading, writing, numeracy, and oral skills. In the national framework for basic skills, digital skills are described as "*being able to use digital tools, media, and resources efficiently and responsibly, to solve practical tasks, find and process information, design digital products and communicate content. Digital skills also include developing digital judgement by acquiring knowledge and good strategies for the use of the Internet*" [7], p. 12].There is no official framework for digital skills or other basic skills for higher education.

### 2.3 Blended Learning

There are many different definitions and interpretations of the term 'blended learning' (BL), but a widespread perception is that BL consists of a combination of face-to-face interaction and the use of online learning tools [8, 9, 10]. Important issues to address are

what is being blended (content) and how (context) [8]. BL can also happen within the classroom; it does not have to be a specific mix of online classes with physical ones. In this paper, BL is used as a concept for understanding the blended practices and learning strategies that young students have – where both textbooks and tablets are part of their learning environment.

## 3. Method

This paper is based on data from Monitor 2019, a national survey conducted in fourth grade, seventh grade, ninth grade, and twelfth grade general studies (studieforberedende).

The data collection was carried out by the author and two colleagues at SINTEF Digital during May 2019. Students were asked to take a position on different types of questions. We used different types of Likert scales, ratings, and yes/no questions.

Monitor has been conducted seven times before, last in 2016. Some of the questions in Monitor 2019 coincide with previous years' surveys in order to find trends. Schools in 212 municipalities received an invitation to participate, and schools from 84 municipalities participated in the survey. 155 out of 869 invited schools participated in the survey, with a total of 3,440 responding students, of which 48.3 percent are boys and 51.5 percent girls. Table 1 shows the distribution of the respondents per grade. In this paper, I only use data from seventh grade and twelfth grade.

*Table 3. Number of respondents per grade*

| 4ᵗʰ grade | 7ᵗʰ grade | 9ᵗʰ grade | 12ᵗʰ grade | Total |
|-----------|-----------|-----------|------------|-------|
| 1015 | 1064 | 630 | 730 | 3440 |

### 3.1 Response Rate and Representativeness

The response rate is an indicator for saying something about the reliability and validity of a survey. The ideal is to calculate the response rate based on the number of invited pupils, but this is unknown in this survey. The invited schools received an invitation letter asking for a response from one class per grade in the target group. The number of students in the given group is unknown. Based on the participation of the total number of invited schools, 155 out of 869, the response rate is low. However, despite a low response rate, the survey is representative in the sense that it has participation from 84 municipalities divided across all regions. Geographical distribution, participation from large and small municipalities, and large and small schools contribute to the representativeness of the collected data. In survey research, response representativeness might be more important than the response rate [11].

Low response rates are somewhat expected when inviting broadly in large populations [11]. The survey is voluntary for the students and has also not been compulsory to carry out for participating schools.

In larger surveys, one should not always look blind at response rates. The margin of error might be another way to calculate discrepancies between the sample and the population. In Monitor 2019, the sample of students is 3,440. See Table 3 for respondents per grade. According to statistics from national authorities, the gross population in the two respondent groups used in this paper is 64,000 (seventh grade) and 35,000 (twelfth grade general studies) [3]. With a confidence interval of 95 percent, the margin of error is between +/- 3.0-3.6% for each of the different respondent groups.

The data material is considered sufficient to provide a representative picture of the digital state in Norwegian schools due to the use of stratified sampling [12].

## 4. Findings

The key findings will be presented in somewhat simplified profiles of two student groups – those that will enrol higher education in 2020 and the ones that follow five or more years later.

### 4.1 Students in Upper Secondary School (The Twelfth Graders)

The twelfth graders (18 years) in the survey are now in 13th grade and will enrol in university or college during fall 2020. All students in upper secondary school have their own computer, either by bringing their own device or by making use of a school leasing system. As many as 74 percent use traditional PC's (Windows), while 26 percent use Mac. Typically, they use their computer on a daily basis in class, but not always in all subjects. Skills and practices are quite similar to the assumed general practice in university and college. That is, to take notes during lectures, make presentations, use of writing tools, spreadsheets and so on. They have less use of creative tools than their younger counterparts, like movie editors, animation apps, or computer programming [12]. However, the twelfth grader differs in some digital activities, such as collaborative writing: Almost six out of ten twelfth graders say they often do collaborative digital writing with their classmates, compared to one of four seventh graders. Furthermore, 56 percent agree that computer-based tasks make it easier to collaborate with other students; only 10 percent disagree.

There is a mentionable positive development of digital maturity among twelfth graders in the last six years. The proportion of students spending time on non-academic activities on computers in class has halved, from 46 percent in 2013 to 23 percent in 2019. Also, reported disturbance of computers in class has decreased from 47 percent in 2013 to 12 percent in 2019 [12].

The twelfth grader is born and raised in the digital era and quite familiar with social media, smartphones, and online games and activities. However, he or she seems to be more traditional when faced with his or her learning strategies. The students were asked to consider the following state me" 50 percent of the twelfth graders agreed, 18 percent disagreed, and 32 percent were neutral.

When faced with the statement, "I learn better by writing by hand than typing on a computer", 43 percent of the twelfth graders agreed, 27 percent disagreed, and 30 percent were neutral. So even though they frequently use digital tools, a small majority seems to believe that handwriting and reading textbooks are better for their learning.

### 4.2 Students in Primary Schools (The Seventh Graders)

This chapter presents some of the key findings among the seventh graders. The average coverage rate of personal computers is 1:2. Twice as many seventh graders report spending more than four hours per week on computers in class than six years ago [12]. The seventh graders use different devices than the twelfth graders: 39 percent use chrome books, 46 percent use PC's (Windows), while 14 percent use iPads or similar tablets. The high proportion of chrome book users is partly because many large municipalities in Norway have chosen G Suite for Education. In the fifth largest municipalities, approximately one out of four devices available for students in grades 1-10 are chrome books [6].

The younger students use their computers in class to write texts, make presentations, and search for information on the internet. 18 percent of students in seventh grade use computers for simple programming activities, compared to 12.6 percent in twelfth grade.

Some primary schools have focused on introducing simple coding throughout the annual Hour of Code, as well as introducing students to micro: bit and simple block

programming. Here we will probably see an increase in the years to come as algorithmic thinking and programming are being introduced in several subjects and grades in the new curriculum from fall 2020. [13]

The survey listed twelve different computer-based activated, from writing to information search and basic programming skills. The seventh graders have the largest proportion of students which have been trained in these skills, with six out of twelve skills (proportion of students in parentheses): writing texts (94 percent), making presentations (91 percent), information search (74 percent), movie editing (34 percent), programming (26 percent) and animation apps (24 percent). In comparison, the twelfth graders have a higher proportion trained in three out of twelve skills, i.e., spreadsheets, online dictionaries, and information literacy.

When faced with the statement "I learn better by writing by hand than typing on a computer", 22 percent of the seventh graders agreed, 30 percent were neutral while 48 percent disagreed. Also, 23 percent of the seventh graders agree that they learn better by reading the paper textbook than a digital one, 36 were neutral, while 41 percent disagree. This shows that a larger proportion of the seventh graders seem to prefer digital learning strategies than the twelfth graders.

There is also a mentionable positive development among the seventh graders when it comes to digital distractions and non-academic use of computers in class. Just above 3 percent of the students agree that they are distracted by computers, compared with 13 percent in 2013. 5 percent spend too much time on non-academic things on their computers, compared with 20 percent in 2016 and 15 percent in 2013 [12]. Time spend using computers in class and access to computers have both a significant increased during the last six years [12].

## 5. Discussion

Can we talk about a paradigm shift in learned skills, knowledge, culture, and learning strategies?

Findings from Monitor 2019 suggests that students are more familiar with computers and digital learning tools in class than what was the case a few years ago. Also, there are less reported distractions and non-academic use of computers during lectures. As for the seventh graders, there was an increase in non-academic use of computers in class between 2013 and 2016. Fortunately, the negative trend did not continue until 2019, even though access to computers and the time spent using them increased significantly during the same period [12]. Both indicate a growing digital maturity among students that will meet academia in a few years from now.

A higher proportion of the youngest students claim to use practical and creative digital tools in class. However, the twelfth graders report of more frequent use of methods such as collaborative writing. At the same time, they have somewhat more 'traditional' preferences regarding learning strategies. The younger students' preferences towards digital learning strategies might be affected by the fact that they generally have less access to computers during class and therefore might be more motivated when they are allowed to use them. On the other hand, research on one-to-one technology in K-12 education shows that students having their own computers are quite motivated in the first few years before the motivation gradually decreases [14].

Overall, the findings in this study suggest that the students have different BL practices. Digital tools are widely used as substitution and augmentation [15]. For example, writing texts on the computer (substitution), using websites related to the textbook (augmentation), and searching for subject-related information on the internet (augmentation). Searching for and finding the right information is considered a basic

digital skill in the framework for basic skills [7], but it does not necessarily have to be an easy exercise. In fact, it may be an exercise itself that students should practice critical thinking related to information search and assessment of sources. In the curricula in major subjects, i.e., Norwegian, English, Social sciences, Science and Physical education, source assessment and various forms of digital judgment are highlighted as important [16]. Information literacy is also an essential skill in academia. One should not assume that the Google generation masters this better than previous generations [5].

On the contrary, this can become an even more in-demand expertise at a time when online research databases and publications are rife, both with and without open access, and where one must constantly assess the credibility of sources. The task of higher education institutions might be to recognize and build on the digital skills of the Google generation so that they develop a more complete digital literacy. Different BL approaches could motivate and engage tomorrow's students. Lecturing and handwriting seem to be more applicable for the forthcoming students, but more interactive solutions could be needed to engage the ones that enrol higher education in five to eight years from now.

## 6. Conclusion

The digital development in education is taking place more as a silent evolution than a radical paradigm shift. Nevertheless, this study shows that there are differences between student cohorts in the years to come, where digital technology affects students' work methods and attitudes towards learning. Digital technology has come to stay and can both redesign and redefine the way teaching is done. What academia needs to ask itself is how and whether one can benefit from the work methods, skills, knowledge, and attitudes that the younger generation brings with them – or should one simply continue teaching as one has done for the last hundred years?

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# Multiculturalism and Social Inclusion

# Building the Religious Field in School within the Migration Contexts: The Case of Spain

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## Abstract

*In this work we address three interrelated issues: immigration, religious pluralism and education system. Religious pluralism has become more visible, largely linked to the migration phenomenon. In the school institution context, we know that the relations between religion and school have been conflictive for at least a century, especially regarding the presence of religion in this type of education [1]. This work addresses how the religious field has been built, the presence and absence of religious diversity in the Spanish education system.*

*Keywords: religious pluralism, educational right, immigration, school*

## 1. Law and Religious Freedom in Spain

In order to address religious plurality within society and the education system in an immigration context, it is necessary to approach the Spanish legal system that regulates these realities. The Spanish Constitution (1978) [2] and the law on religious freedom of 1980 (Ley Orgánica de Libertad Religiosa or LOLR) [3] established a recognition of the various faiths rooted in Spain and opened the possibility to religious pluralism. However, at the beginning, such possibility only stagnated in the legislative framework without effects in the social practice [4]. Thus, the Constitution of 1978 was a turning point in the relations between Church and State as well as from the perspective of human rights.

That is obviously related to democratic transformation, which also affects the religious freedom. The article 16 of the Constitution recognizes such freedom, as well as the State secularity and the social dimension of the religious pluralism, in conjunction with the commitment of the public powers to maintain "cooperative relations" with the confessions [5, 6 and 7]. The latter indicates a certain degree of relationship with all the confessions even tough with a subtle favouritism. That is to say, it is the Catholic Church the only one mentioned explicitly and in a particular way. That subtlety appeared in the draft of the Constitution while it was taking place a negotiation with the Holy See on various kind of agreements (legal, economic, educational and cultural...), agreements that were then signed in 1979 [8].

The promulgation of the LOLR develops the content of the art. 16 of the Constitution and specifies those "relationships" previously mentioned in the art. 7. Thanks to this law many of the non-Catholic groups that had been either in exile or underground during the years of the national-Catholicism and in the early years of the transition – fearing even persecution – lost their fear and went out from the invisibility [8]. This law also led to the signing of agreements in 1992 with the confessions of "notorious roots": evangelical churches, Jewish communities and Muslim communities. In order for a religious

confession to be able to access the Agreement, that confession has to meet two conditions, as stated in art. 7: being enrolled in the Register of Religious Entities and having established notable roots (according to the number of believers) in Spain.

## 2. Teaching of Religions in the Spanish Education System: Freedom and "Formal or Real" Law?

In the Constitution of 1978, the teaching of religions is included in the article 27.3, which establishes the right of parents to make their children receive a religious and moral education in accordance with their convictions. In that article, parents are recognized as the holders of that right, while the State is the guarantor of it. As for the LOLR of 1980, it foresees that the public powers will adopt the necessary measures to facilitate religious formation in public education centers (art. 2.3). On the other hand, it should be underlined that its art. 7.2. indicates that the agreements with the Churches, confessions or religious communities will always respect the principle of equality. This principle is susceptible of analysis through the comparison between the different agreements and the implementation of school teaching of religions, as we will do.

First, the article 10 of the three agreements (with the Federation of Evangelical Religious Entities, Jewish Religious Entities and the Islamic Commission) [9, 10, 11] regulates the teaching of religion in the same way. This article indicates that the students, their parents and the government school bodies are guaranteed with the former's right to receive "Evangelical, Jewish, Islamic" religious education in public and private education centers, provided that, with regard to the latter, the exercise of that right does not conflict with the centre's own nature, speaking of infant education, primary education and compulsory secondary education (art. 10.1). The agreements also establish that the confessions are charged to appoint teachers, and establish the programs and the textbooks to use (art. 10.2 y 10.3). Based on the text of the agreements, we can point out three aspects of interest:

   a) The three agreements mention the teaching of religion in a general way without referring to its integration in the official curriculum as a teaching subject. That is not the case of the Catholic religion, for which the agreement of 1979 specifies that "the teaching of the Catholic religion will be carried out in educational centers, in conditions comparable to other fundamental disciplines" (art. 2.) [12].
   b) The existence of "conflict" between religions is taken for granted. This justifies the freedom of the centers to not offer "other" religions. From this approach it is difficult to maintain the principle of equality proclaimed by the LOLR itself.
   c) As a result, it derives that, in a latent way, the centers are allowed to make value judgments about the suitability of these "other" religions, probably from an ethnocentric perspective, giving rise to unequal, discriminatory and selective treatment. This is especially serious considering that this freedom to refuse to offer the teaching of "another religion" is being given to state-subsidised centers, which receive public funds.

Similarly, the current education law, the LOMCE of 2016 (Ley Orgánica para la Mejora de la Calidad Educativa) [13], in its provision dedicated to the teaching of religion, establishes a point for the Catholic religion and another for "the rest". This implies a differentiation which emphasizes even more when considering that only for the Catholic religion it is indicated that "it will be included as an area or subject in the corresponding educational levels". This makes it possible for the "other religions" to be relegated to a non-teaching subject, hence with the possibility of being offered as an extracurricular activity and, therefore, not receiving equal treatment with respect to the Catholic religion.

We must remember that the Constitution, when declaring that there will not be a state

religion, implies the non-privilege of any religion, even more so when the art. 7.2 of the LOLR establishes that the principle of equality will govern the establishment of agreements with the different confessions. Despite the possibility that the LOMCE opens in the school practice all religions are offered within the school day with a notable difference. In the case of "other religions" (Resolutions of the 23 April 1996) [14, 15] these are only offered if there is a sufficient demand, that is to say at least 10 students, so that it is possible to group them according to their levels. It could be questioned whether the right to receive religious education should prevail (as recognized by legislation), regardless of the number of students that this implies, being the school practice a paradox or contradiction.

## 3. Are there "Second-Class" Religions?

Various criticisms have arisen from the implementation of the regulations. Firstly, the instruments used to ensure religious plurality in schools have been – and are – increasingly restrictive, since only those confessions that have signed cooperation agreements with Spain are admitted. In other words, those minority confessions that have not signed these agreements are no longer present in the compulsory planning of the education centers [16]. On the other hand, in its latest report on the situation of religious freedom in Spain, published in 2018, the Ministry of Justice collected the data provided by the Federations or religious Communities (which are aware of the education reality through the families' complaints). Within these data, we must highlight: the lack of information given by the education authorities of some education centers to parents and students about the possibility of taking "other religions" classes (there are cases in which the checkboxes for the option of a religion other than the Catholic do not appear on the registration forms); the information system of many centers has not been adapted with the religion option; many centers that have the option in their forms do not then transmit the data to the Ministry of Education; also, some education administrations do not communicate the demands for the religious education to the religious federations or communities (which have to respond to such demand). Also, Riay Tatary, president of the Union of Islamic Communities in Spain (UCIDE), in an interview with the Spanish News Agency EFE in October 2019, expressed the complaints coming from the parents.

Apart from some that have been already mentioned, he points out that "there are also frequent warnings from the directors of some schools that try to dissuade parents from enrolling their children in these subjects, arguing that in order to attend them, students will miss classes in core subjects like math…"

## 4. Conclusion

We will conclude by pointing out that despite the secularity of Spain, the Catholic religion continues to be the privileged one in the educational system. The acknowledgment of the country's religious plurality is partial and more formal than real.

It is therefore necessary to rethink the management of religions in the Spanish education system, and to develop strategies that contribute to eliminating the structural conditions and situations that allow the domination of some cultures over others. This is manifested in the invisibility and curricular injustice suffered by minorities religious in the education system [17].

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# Digital Scaffolding for Non-Traditional Students: Framing Social Interactions in Educational Online-Settings at Universities of Applied Sciences

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## Abstract

*The project presented here contributes to reducing educational barriers for non-traditional students as well as providing a needs-based individual support of this specific target group. In particular, the social relationships in learning and teaching processes will be taken into account. Especially, cooperative and project-based pedagogies, which are commonly established at universities of applied sciences, will be addressed. It will be tested whether an online-based "scaffolding" can contribute to strengthening the academic and social integration of this specific target group. Within the general framework of "scaffolding", different educational technologies are applied and their potentials are systematically evaluated with regard to the design of flexible, individual and socially networked educational processes. In addition, students' competencies in dealing with virtual forms of interaction and media-based learning are promoted. The use of digital media and their effectiveness in shaping learners' social interactions in educational settings will be closely interlinked during the entire project period. Therefore, a high degree of transferability of the results to adjacent fields of practice can be expected.*

*Keywords: digital scaffolding, shift from teaching to learning, social integration, university teaching*

## 1. Introduction

Universities of applied sciences benefit institutionally and culturally from a highly heterogeneous student body with diversified educational biographies (e.g., students entering the university based on a vocational baccalaureate, a master craftsman's certificate, previous professional training). The heterogeneity offers potentials for mutually stimulating learning processes. Consequently, up-to-date concepts of university teaching are increasingly focusing on cooperative learning and project-based studies ("shift from teaching to learning" [1]. One side effect of this shift, however, is an increasing centralization of student presence at the university location, which might tend to disadvantage individual students with special needs or in exceptional life circumstances. However, less participation in on-site events at the university is associated with a lack of academic and social integration [2, 3]. With the universal spread of mobile technologies and 'social' software, new possibilities for interaction are emerging, offering a wide range of possibilities for cooperative and collaborative learning, social exchange and peer interactions.

## 2. Theoretical Approach and State of the Art

Given the heterogenous student population, it can be assumed that participating in collaborative pedagogical settings poses a challenge for a considerable number of students at universities of applied sciences. Educational support measures in terms of "digital scaffolds" are supposed to help to address individual challenges. By the term "digital scaffolds" we refer explicitly to media-supported, online-based educational support functions that mediate social interactions at a distance.

The concept of scaffolding has been used in educational discourse since the 1970s to describe educational support for solving particularly complex problems: "a 'scaffolding' process [...] enables a [...] novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts" [4].

Research on scaffolding initially focused on the interaction between expert and novice (ibid). Later research concentrated more on student learning processes, expert strategies during scaffolding interactions, challenging of peer group contribution or characteristics for "ideal" scaffolding learning guides. The term is used today in the context of both formal and informal education ("scaffolding incorporated in formalized activities" vs. "informal scaffolding"; see for example [5]).

A distinction is often also drawn between *social* and *technological* forms of scaffolding (*ibid.*). We refer to this distinction in an exclusively analytical way: This means that we focus both on interactions (*process perspective*) and the research-based development of supporting digital learning architectures (*structural perspective*).

Our research focuses on digital scaffolds that support non-traditional students' academic and social integration: It has been shown that academic and social integration is usually a relevant criterion for completing a degree (see e.g., [6]). Integration, however, requires students to participate in dedicated activities such as on-site courses or peer learning communities. Special attention will be paid to non-traditional students who face challenges participating activities because of circumstances such as familial duties or intensive part-time. Besides the social context, the academic context will also be included: Key qualifications, such as the ability to cooperate and work in a team are increasingly important [7]. To emphasize such competencies goes hand in hand with a shift from content-oriented teaching approaches to more student-centered teaching ("shift from teaching to learning").

Collaborative, action-oriented teaching-learning formats are finding their way into modern university teaching [8]. Consequently, the forms of communication and cooperation of all higher education actors are changing. Currently, the support of teaching-learning processes through digital media in university teaching is increasingly being examined from theoretical perspectives (e.g., [9]) and isolated empirical analyses (e.g., [10]). Empirical longitudinal studies on the digital support of academic and social integration of students in general and especially the non-traditional are scarce.

## 3. Research Design and Methodology

We examine the academic and social integration of non-traditional students by means of effective digital support functions ("scaffolds"). Our overall aim is to gain knowledge about (a) how to interlink diverse formal learning processes and (b) how to effectively improve digital scaffolds in a research-led way (see section 4). Therefore, we conduct a longitudinal analysis of how students with diverse individual requirements interact with digital scaffolds that support their social and academic integration.

Our working hypothesis is that, paradoxically, up-to-date variants of teaching at applied universities (e.g., project-based teaching, laboratory work placements, field

studies, cooperative and practice-oriented learning formats) run the risk of disadvantaging or even excluding non-traditional or special-need students. This may result in particularly stressful situations and can potentially have a negative impact on academic success [11]. Effects may include exceeding the standard study period, lower self-efficacy expectations, and more frequent doubts and discontinuation of studies (cf. [11] and [12]).

We follow a *Design-Based Research* agenda consisting of four core activities feeding into one another (Fig. 1). All project phases target both design and theoretical objectives: In the analysis phase, qualitative individual and group interviews will be used to grasp the heterogeneous life situations and need structures of the target groups in a differentiated way. The development phase will be accompanied by a longitudinal study.

Both quantitative and qualitative methods are used. Short surveys will be integrated into the digital support services and the evaluation of usage data to differentiate the surface structure of the use of the services by different target groups. In the evaluation phase, the depth structure of the interaction of selected users with the offer is recorded.

In addition to surveys, ethnographic approaches are also used here (daily accompaniment in the sense of "shadowing"). The results of the research are incorporated into the development of digital support offers and dissemination of research findings.
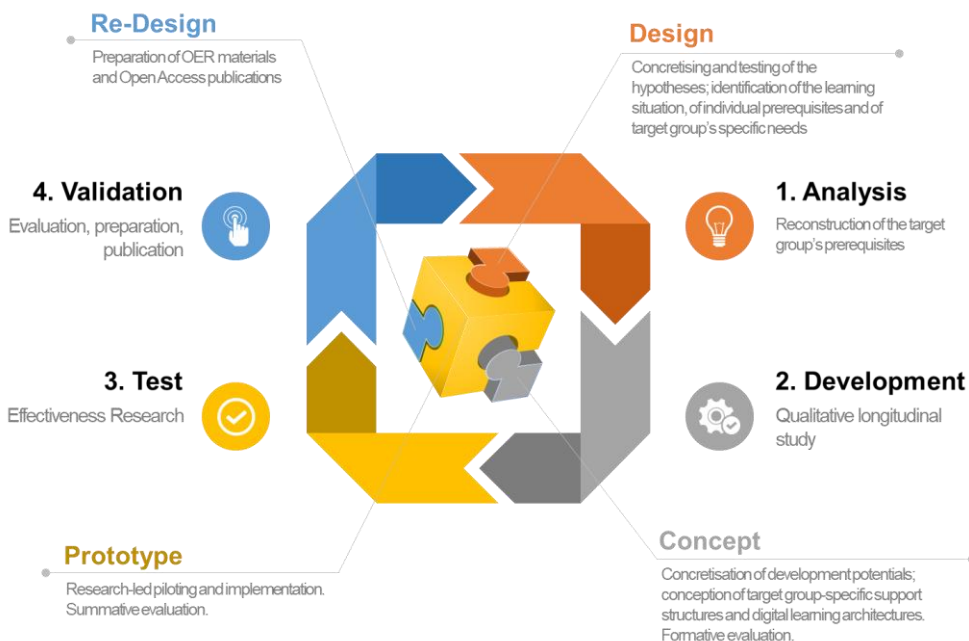


*Fig. 1. Objectives of the Design-Based Research program (outside)
and "building blocks" of the research plan (inside)*

## 4. Objectives

The project aims to exploit the potential of digitization in order to use tried and tested solution arrangements for improving non-traditional students' academic and social integration. It pursues (1) a research and (2) a closely-related development goal. These objectives are methodologically intertwined and both conducted in an iterative-cyclical

way (Design-Based Research methodology; see section 3).

(1) Our main **research objective** is to empirically test the working hypothesis (see section 3), to systematically evaluate the findings and to investigate the development and implementation of digital scaffolding. For this purpose, we distinguish two sub-goals:

    a) The *descriptive research goal* is to empirically determine patterns in the study behaviour of the target group and to draw conclusions about interdependencies between individual life situation, didactic teaching/learning setting and social integration as well as study success.

    b) The *design-oriented research* goal is to derive recommendations from descriptive research for the (further) conceptualization of "digital scaffolding" and to evaluate its validity.

(2) Our main **development objective** of the project is to outline and implement digital support services for individualized scaffolding based on the descriptive and conceptual results, as well as the corresponding evaluation. This is done in a structural and a process-related target dimension:

    a) *Structural*: design of a digital learning setting. This involves the use of tried and tested e-tools (such as digital classrooms or learning platforms) that are already established at the OWL University (cf. [13]). In particular, self-directed learning phases, discourse phases and project-learning phases are digitally structured. Teachers are guided and accompanied in the development and implementation of flexible forms of teaching. Based on the needs of the addressed target group, coordinated and (partially) individualized digital-learning environments are developed [14].

    b) *Processual*: individual educational support. Students are provided with educational mentoring when using the online-supported learning structures. Especially, exchange and organization formats are established (e.g. through individual online tutoring and learning-path guidance). Tutoring remedies provide easier access to social learning processes and integrate them more strongly into the student community. In addition to supporting social participation, skills in using digital tools are also trained.

Both, the digital learning setting (2a) and the associated individual support (2b) are provided during the introductory phase of studies. Here, students are often confronted with a variety of academic and everyday challenges [15] which have a negative impact on self-efficacy [16] and can lead to study doubts. The strengthening of academic and social integration at the beginning of one's studies should counteract such negative effects (cf. [11]).

The "digital scaffolding" to be developed does not have a broad effect but rather addresses non-traditional students in a decidedly demand-oriented manner. This alone distinguishes the concept outlined here from previous initiatives.

## 5. Conclusion

Our research and development project presented here was inspired by the naturalistic observation that well-intended complex pedagogies run the risk of excluding students living in special circumstances, commonly referred to as 'non-traditional'.

Catering to these students' needs in traditional ways, e.g., by providing distance-learning settings as an alternative to on-site classes, may actually contribute to segregation processes rather than social and academic integration which are important for students' persistence. Thus, our approach tries to exploit the affordances of digital technology for distance education while avoiding the potential pitfalls of social isolation and segregation. As we focus on individual differences and needs, we favour a design

research approach over correlational designs such as large-scale panel studies, which, however, may be a next step in our research agenda. The results of our research are to be classified against the background of further findings, for instance, empirical studies on drop-out factors (see, for example [2, 3 ,12]).

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# How Much Is Your School Inclusive?
# Ideas from the Multinclude Project

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## Abstract

*The Multinclude project aims to define educational inclusion policies to realize a pathway to success up to university for all students and especially those at risk of exclusion (minorities, migrants, people with disabilities, in poverty, etc).*

*The Multinclude project collected around 70 good practices of inclusions worldwide and through an analysis process based on a different theoretical framework, like inclusive excellence and super-diversity. The analysis report allowed the project to identify several inclusion dimensions and to design the multinclude inclusion matrix.*

*Replying to a set of questions, the inclusion matrix will return, in a visual way, the position of the school concerning the seven inclusion dimensions. The final objective is to engage education institutions in putting in place corrective actions.*

*Keywords: Inclusion, Diversity, Policy, Matrix, Toolkit, MOOC*

## 1. Introduction

One of Europe's characteristics is the concept of diversity: there are 225 languages spoken in Europe, and of these 60 are minority languages, but this diversification is further increasing.

Migration and globalization are causing social changes that create new opportunities and challenges for educational institutions. The growing number of refugees, asylum seekers and migrant children lead schools and teachers to reinvent daily practices and strategies to respond to new learning needs.

Following the Euryidice Report [1] "A student who is well-integrated into the education system both academically and socially has more chance of reaching their potential.

Students from migrant backgrounds, however, face several challenges in this respect that can affect their learning and development."

According to OECD PISA [2] data, students who have a history of first and second-generation migration have worse school outcomes than their peers, a disadvantage also shared by historical ethnic and linguistic minorities from disadvantaged socio-economic backgrounds: language problems and monocultural programs can bring these students to drop out from school.

The kids who cannot acquire knowledge and skills today will be marginalized workers that will probably feed the so-called gig-economy tomorrow.

Education systems of respective European countries were not designed for the current population. In superdiverse cities like Paris, The Hague and Brussels there is no majority anymore. These are so-called majority-minority cities [3]. The population in

these cities consist of all minority groups. The previous majority also became a quantitative minority. Quantitative diversity is not a guarantee for equal opportunities in education and at the labour market.

The increasing diversity in European countries required a vision on inclusion and inspirational practices for supporting institution to grant education equity. There is a great need to successfully implement tested models of inclusive practices within schools and learning communities, to achieve the impact on an individual, institutional and systematic level. Previous analysis [4] showed the importance of initiatives not only funded by the governments to support inclusion: Universities, NGO, local communities and student associations are promoting new approaches and finding creative solutions, through different types of informal education, for instance supporting homework or learning the local language, providing room for intercultural dialogue or more structured initiatives like children's universities.

## 2. The Multinclude Project

The Multinclude project (www.multinclude.eu), created thanks to the support of the Erasmus + Program, is designed to seek, promote and disseminate the good practices that have been developed in several parts of the world, especially in Europe. The goal is to identify proven ideas and practices that have the potential to be implemented with small investments and that can be spread, replicated and are scalable as needed.

Once the best ideas have been identified, the project means to spread the methodologies to which they do reference to incorporate them in the inclusion strategies of schools, as well as in the training of teachers across Europe to improve their approach to inclusion issues. The project is based on two very precise assumptions: firstly, starting from the multitude of initiatives managed by individual schools, NGOs and Universities that have proven successful in improving participation inclusive to education; secondly, respond to requests from schools and other institutions of education to know and implement future initiatives to improve their inclusion strategies starting from good practices already consolidated over time
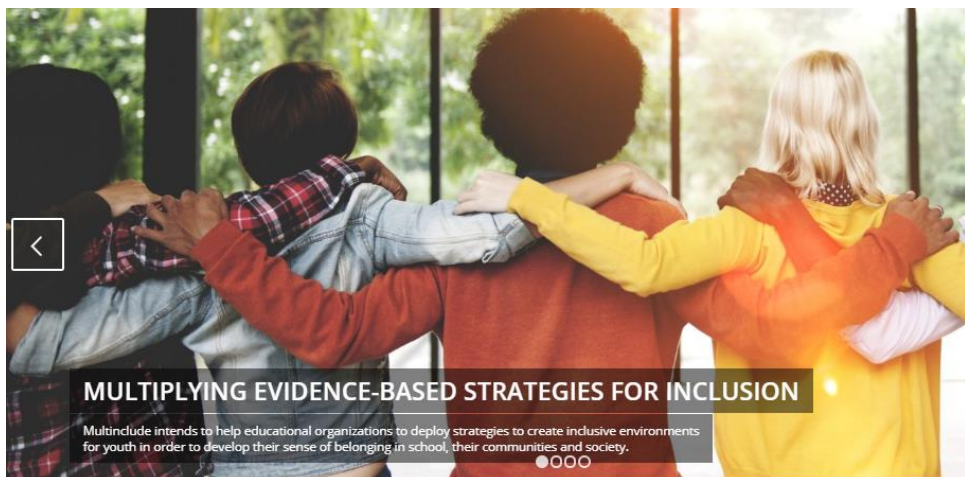


*Fig. 3. Multinclude homepage*

The DSchola Association is the Italian partner of the Multinclude project, created thanks to the support of the Erasmus + program, together with six other European

institutions: The Hague University of Applied Sciences, The Knowledge Innovation Center, ECHO Expertisecentrum Diversiteitsbeleid, Malmö University, Vienna University Children's Office, European School Heads Association.

## 3. The Collection and the Analysis of the Cases

The project started by collecting inclusion initiatives adopting evidence-based methodology. The collected cases aimed at reducing non-equity towards under-represented groups (for origin, socio-economic condition, health conditions). The focus of the project is aimed at completion by disadvantaged groups of higher education; a path that involves all degrees of education, starting from kindergarten, including formal, informal and non-formal education.

More than 70 initiatives have been selected on the theme of educational inclusion, which can be found on the site, using tags or full-text research. These "cases" tell stories of long-staying hospitalized children, students with disabilities, "complicated" schoolchildren with behavioural disorders, young adults who need to overcome the obstacle of the language of a new country to stay or find a job, of the difficult living together between different cultures, the difficulty of finding your way around after school, of making friends when you don't know each other.

The following step of the project was the analysis of the cases, based on multiple contextual dimensions of inclusion in education. The partners of the project decided to adopt the following parameters in the analysis of the cases considered:

- to be independent of possible policy changes and to be an integral part of the main activities of the institutions and regions;
- have measurable results and successful qualitative outcomes;
- be efficient and effective so that they can be replicated in a short time and with resources limited;
- be innovative in their implementation, content, political and regional context or mission and vision;
- touching on sensitive issues that are part of initiatives to reduce inequalities in society;
- support the visibility and success of previously unrecognised groups.

The partners then selected seven significant cases for further analysis to find commonalities, synergies and specificities to support the development of best practices of inclusion at the European level. The in-depth analysis of the seven cases has adopted the "Theory of Change" scheme which, at starting with the problem, goes so far as to define the long-term impact.

The report [5] provides a cross-cutting analysis of these practices, focusing on three types of changes to improve inclusion in schools: strategic administrative actions, changes curricula and pedagogical changes. It also points out that successful cases, while having clear results and measurable according to their original objectives, usually also have an element of unexpected impact on better inclusion.

All 72 cases have been assessed according to the different learning conditions, taking into account consideration of aspects such as the social context, physical and pedagogical environments. The report also highlights some important positive aspects for learning and inclusion that are defined and linked to the different cases, such as filling gaps, social skills, language and learning through a holistic approach. One-third of the programmes receive public funding, one third from educational institutions and one third from foundations or private sponsors. The analysis highlights the great diversity of the

target groups, the increasing commitment to inclusive education underlined by the fact that in recent years there has been a growing number of initiatives. The case studies were also divided into groups according to their primary objectives: prevention, intervention and/or compensation.

The fact that almost a third of the cases have been initiated or implemented exclusively in the field of education with the ultimate objective of better school inclusion highlights the importance for the schools to implement an open approach, of collaboration with their internal and external stakeholders to achieve the goal of inclusive, quality education.

## 4. The Multinclude Inclusion Matrix

The result of the analysis work has identified 7 dimensions and 4 areas of intervention for inclusion that are summarised in the so-called "inclusion matrix". The four areas identified are:

- Social Development and Intellectual,
- Educational Resources,
- Cultural Differences,
- School Environment.

The seven dimensions are

- Admission and access,
- Social interaction,
- Support for students and participants,
- Administration,
- Teaching,
- Extracurricular and community support activities,
- Assessment and recognition.

Every dimension is made of about twenty questions, to make it easier for schools to analyse their inclusion policies, starting a reflection to try to identify their grey areas.

For facilitating the schools, the partners, including Dschola Association, organized workshops, aimed at illustrating the matrix and encourage educational institutions to implement their vision of inclusion, based on its context. Schools are asked to define their "mission statement" and to commit themselves in enhancing their inclusion policy.

The Multinclude inclusion matrix is provided with a toolkit for organizing workshops in the schools and it is available on the website for download.

The partners of the project started to organise in presence workshop with the schools but due to the Covid-19 emergency, it was impossible to continue and some webinars were organized instead. Moreover, to support schools in adopting the Multinclude inclusion matrix an online version is available on the project website: this tool allows to answer to the questions of the matrix and accessing a result dashboard.
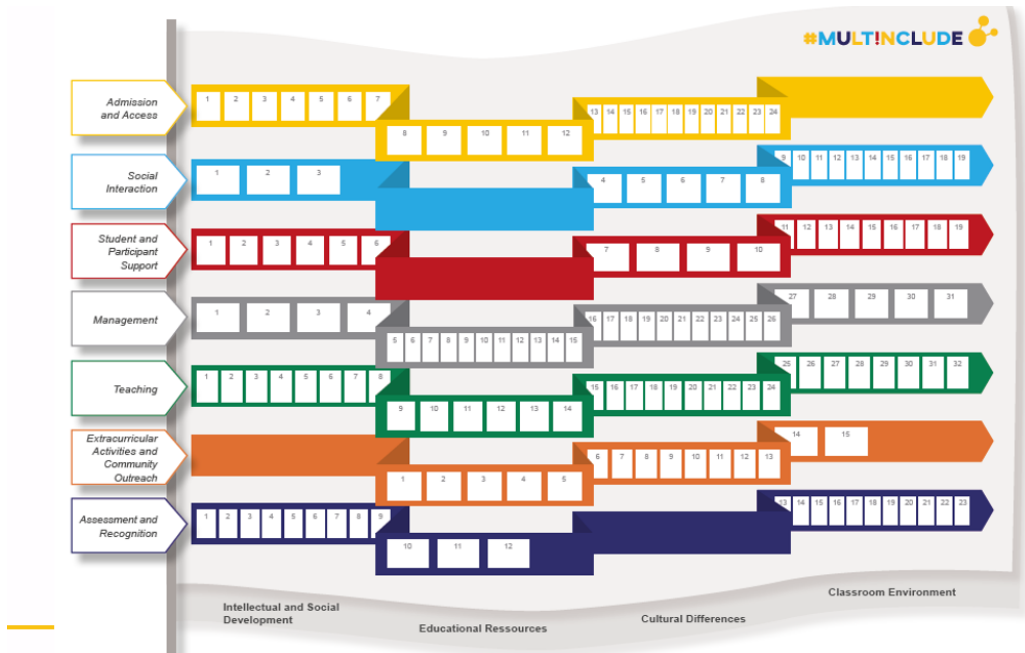
*Fig. 4. The Multinclude Inclusion Matrix*

## 5. Further Developments

The project organized webinars to give voice to the protagonists to promote and disseminate the best experiences: the records of the webinars can be reached at this address https://multinclude.eu/webinar-series/.

Moreover, you can subscribe to the free MOOC, "Pathways to inclusive education" (Pathways for inclusive education) hosted on the platform of the University of Malmo to learn about inclusive education and on inclusion theories.

We invite those interested in improving their inclusion practices on a personal level, professional or institutional or intends to propose further practices of inclusion, to enrol in our learning community to continue our dialogue there:
https://multinclude.eu/learningcommunity.

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# Intergenerational Education: A Proposal for the Recognition of Diversity and Social Inclusion

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## Abstract

*In present-day society, characterised by the increase in life expectancy, the accelerated changes in all spheres (social, family, economic, cultural, educational, technological, etc.), multiculturism and diversity, it is necessary to accept and value heterogeneity as a positive factor that forms part of the social dynamic [1]. Often, diversity, by reason of gender, race, economic status or age, is presented as a problem that affects equality of opportunity. Specifically, as Montero and Baena [2] point out, certain historic and socio-economic changes have favoured and sometimes imposed segregation by age in the social, educational and working continuity that has relegated elderly people to the second class. From this perspective, this study seeks to make intergenerational education visible as a possibility to promote the recognition of diversity of age and to foster it as an efficient proposal for the inclusion and social recognition of elderly people. A review of the literature demonstrates the need for and value of intergenerational education in the framework of present-day society, and proves that intergenerational education enables diversity to be recognised and heterogeneity to be valued as an enriching element.*

*Keywords: Intergenerational Education, diversity, social inclusion*

## 1. Introduction

In present-day society, characterized by increased life expectancy, the accelerated changes in all spheres (social, family, economic, cultural, educational, technological, etc.), globalization, multiculturalism and diversity, it is necessary to accept and evaluate heterogeneity as a positive factor that is part of social dynamics.

Often, diversity for reasons of gender, race, economic status or age, is presented as a problem of equality of opportunities. Specifically, as pointed out by a Montero and Baena [2] certain historic and socio-economic changes have promoted and at times imposed, segregation by age in social, working and educational continuum that has relegated elderly people to the second level.

A method of recognizing the varied and heterogeneous nature of society is reflected in the backing given by national and international organizations to foster intergenerational relations and learning among distinct generations with the aim of achieving intergenerational solidarity [3]. Intergenerational Education can contribute to balancing out inequalities and overcoming social segregation by promoting understanding and respect among generations, enabling societies to develop [1].

A society cannot evolve if its population groups do not inter relate and even more so, if they do not know each other. In this sense, intergenerational education is an opportunity for bonding between different generations which enables them to develop together. The challenge is to consider elderly people apart from their age, as people,

with possibilities for development and social participation, without interposing discriminatory and stereotyped views [4].

From this perspective, this study seeks to make visible intergenerational education as a possibility to promote the recognition of diversity by reason of age, and to encourage it as an efficient means for the inclusion and social recognition of elderly people.

## 2. Pertinence and Relevance of Intergenerational Education

Nowadays, due to the rapid demographic changes experienced in the world in recent decades, age is presented not only as a factor of diversity, but also as a reason for exclusion in the fields of work, education and social life [2].

Formerly, age provided a more important status, both quantitively and qualitively. But now, age, by itself, does not confer social status. The value usually attributed to an older social group is that of experience, which now is underrated in most cases [1, 5].

The discrimination that arises from age prevents the definition of a clear and positive role for old age. For example, the elderly does not have work obligations, and this marginalises them socially. It frees them of duties, but at the same time, it devises them of status and positive social roles.

This situation brings us to look for a profound qualitative change for the elderly so that old age should be considered as another stage in life and not as a period of weakness and breakdown. We find ourselves faced with a reality to which the sphere of education cannot remain indifferent. Therefore, intergenerational education is a fundamental tool, since among its aims we find how to confront marginalization through education, promoting the development and recognition of everyone, at the personal and social level, regardless of their age [2, 1, 6].

### 2.1 Conceptualization of Intergenerational Education

In order to understand the concept of intergenerational education we refer to two key definitions for its identification and recognition.

Sáez [7] defines it stressing the relationships between people to facilitate personal empathy:

Processes and procedures that support and legitimize it emphasizing cooperation and interaction between two or more generations whatever, obtaining the sharing of experiences, knowledge, skills, attitudes and values, in search of their respective self-esteem and personal self-realizations. The objective is to change and transform itself in learning with the others (p. 29).

García Mínguez [8] points out that intergenerational education discovers the common values of different age groups enabling them to carry out different life projects in common: "Education between generations is a dialogue of cultures that, starting from common motivational fields, tries to discover the symbolic values leading to the enrichment of the life projects of different groups" (p. 21).

These definitions of intergenerational education enable us to identify its characteristics:

- Intercultural dialogue
- Liberty
- Shared reasoning
- Sharing experiences, knowledge, skills, attitudes and values
- Relationships of equality
- Transformation from learning with others
- Gratification of life projects

In short, as Muñoz y Montero [1] says, intergenerational education starts initially from taking into account the elements that are typical of each individual and that can be transformed to improve the conversation with the other and so achieve a better social and personal relationship. For that, intergeneration dialogue recognizes that there are differences and there is a way to find them. This does not mean that the logical differences established during the course of life should be rejected, rather it is an attitude, an acceptance of the other person, which brings about an enrichment in one's vision of the world and the strengthening of values such as tolerance, mutual recognition, respect, co-existence and solidarity. Thus, it is not worth so much to draw close to the other to be, but to know ourselves and, from there, to understand and value ourselves and to act.

### 2.2 Characteristics of the Teaching Model of Intergenerational Education

In line with what has been said above, to make intergenerational education possible a teaching model is required that considers a series of principles: Minguez [9] establishes the following characteristics of the educational model for intergenerational relations:

- Focused on improving communication,
- Based on respect for mutual rights and duties,
- Grounded on participation and dialogue,
- Supported on new methods: Innovation and creativity,
- Opening up to diversity and personalized attention,
- Oriented to teamwork,
- Integrated into the real socio-cultural context,
- The ecological scenario is built on the common needs of both younger and older people,
- It is realistic, interactive intervention based on solidarity,
- It is an intervention boosted by humanistic values and attitudes.

### 2.3 Benefits of Intergenerational Education

Educational experience and research carried out from the intergenerational perspective confirm multiple benefits for the people who participate and for society as a whole [1, 10, 11, 12]. Thus, the benefits referred to are:

- People of different generations can share their talents, resources, experiences etc.
- It avoids exclusion for reasons of age,
- It overcomes mutual myths and stereotypes,
- It recognizes the positive value of diversity,
- It will introduce new roles and perspectives,
- It will improve self-esteem and understanding,
- It makes the social inclusion of elderly people possible.

In short, intergenerational education is a possibility for the recognition of diversity as an enriching element and will enable a society for people of all ages to be built [3]. In this sense, Henkin [13] recognized that intergenerational education came with the following values:

- Interdependence given the feeling of responsibility shared among people,
- Reciprocity to assess and learn among all age groups,
- Individual worth, regardless of age,
- Diversity as an enriching element,
- Inclusion,

- Equality,
- Social connectivity.

## 3. Conclusions

The study confirms that intergenerational education enables diversity and the evaluation of heterogeneity to be recognized as enriching elements. The closer and deeper knowledge of the various age groups makes it possible to create a more real perception of the other, as well as value people's human and social capital. The recognition of the social capital of elderly people is the first step to promote their inclusion and social participation as active members and citizens with full rights in present day society.

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# Science Education

# Advances in the Use of the Model of Flipped Classroom with Collaborative Learning as a Helpful Tool to Study Metabolism

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## Abstract

*The transition from the traditional educational model centered on teaching to that emanating from the EHEA focused on learning and the acquisition of competences by the student implies a change in the educational paradigm. This makes it necessary to complement the master classes with active methodologies that enhance the central role of the student in his or her learning process. Our experience shows that collaborative learning and class inversion (flipped learning) are methodologies that can be useful to improve the teaching/learning of Biochemistry and metabolism for Biology student. However, because of the idea that they will be forced to give up parts of the curriculum, not many teachers use it in the teaching of Biochemistry. The different roles of teachers and students in this new scenario, its advantages and disadvantages, flipped learning, collaborative learning and problem-based learning are analysed in the present communication with specific hints to their application for the learning-teaching of metabolism.*

*Keywords: collaborative learning, flipped learning, metabolism*

## 1. Flipped Learning

The European Higher Education Area (EHEA) has changed the focus and the models of learning-teaching from traditional educational models centered on teaching to a learning-teaching model centered on the students as the main protagonists of their own learning through the acquisition of competences. In this new scenario, the role of teachers and professors' changes to that of an accompanying facilitator of the learning and acquisition of competences by their students.

The term "flipped learning" encompasses a set of teaching methodologies that have the following points in common: a) The information to be learned by the student is taken out of the classroom and transmitted by the teacher online as links to documents, presentations, videos and podcasts, etc. b) Class time, instead of the traditional master classes, is dedicated to discussing what the students have not understood well, working on cases, projects and problems, collaborative work, etc. (active and inductive learning).

All this takes place under the supervision and guidance of the teacher.

The different methods of flipped learning differ, fundamentally, in the type of online communication before classes; in the way in which it encourages and checks the student's previous study, and in the tasks or specific activities that are carried out in the classes. With these methodologies, not only the use of time and space in the classroom and outside is reversed, but also the role of teachers and students in the classroom is altered. In traditional classes the teacher is the protagonist, he or she is placed on the stand looking at the students and explains the lesson while they attend, take notes and occasionally ask questions. In reverse teaching, on the other hand, the students are the main protagonists, they work actively while the teacher observes how they do it, helping them when they have problems or when they are asked to do so.

Flipped learning can be much more pedagogically effective learning methodology than traditional master classes. Some of its strengths are: a) It stimulates the students' continuous study, avoiding the typical last-minute binges. b) It makes it easier for all students to understand the information, since they can access it as many times as they want. c) It allows class time to be spent on activities led by the students without slowing down the pace of progress with the syllabus, since it is transmitted online. d) It allows the realization of formative evaluation activities and metacognitive reflection during class time. e) The tasks are done and corrected during the class, thus facilitating the management of the teacher's feedback on the work products of their students. The main weakness of the inverse model is that it gives more work to teachers, especially: a) In the preparation and design of the materials to be transmitted to their students. b) In the preparation of pre-study verification questionnaires, and the analysis of the students' answers. c) In the redesign of classes to respond to difficulties and to carry out new activities.

The first well-documented model of a flipped classroom was carried out in 2007 by the chemistry teachers of Woodland Park High School in Colorado (USA), Aaron Sams and Jonathan Bergman [1]. The used simple software that allowed them to capture images of the power-point presentations of their classes, began to record videos so that those students who had not been able to attend the presentations would have the opportunity to retrieve them. After some time, they noticed that even those students who regularly attended the classes consulted the videos and used them to prepare for the exams. It was then that they thought that if they sent the students to watch the videos as homework and take notes of their contents, they would be able to spend the time in class solving doubts, discussing and carrying out other activities where the students would apply what they had learned. Later, due to the positive results they obtained with their students, they decided to freely share all their class videos as open educative resources.

Before that date, methods had been developed to check the previous study of the students using reverse methodology, although they did not use videos to transmit the information to the students (YouTube did not exist), but different electronic documents.

Of these methods (known as blended-learning methods) the Peer Instruction, the Just-in-Time-Teaching, and the Team Based Learning stand out [2-4]. Currently, there are many combined flipped learning methodologies [5, 6]. One of the most widespread methodologies, and the only one that will be discussed here, is the Flipped-classroom with Just-in-Time-Teaching (JITT-FC). To implement this method, a few days before the start of the class, the teacher indicates to his student's what documents of the virtual campus they should study (links to videos, electronic documents, etc.) and send them a questionnaire that they should return at the end of their study. From the analysis of the answers to this questionnaire the teacher will obtain valuable information about the level of understanding of his students, the parts of the subject that they understand well, and therefore it would not be necessary to influence them in class, and those in which they find special difficulties or make mistakes. This information will allow the teacher to rethink

his or her class and guide it ad hoc in order to clarify precisely these points of conflict. If, after these clarifications, time is left over, the rest of the class could be dedicated to activities where students can actively apply what they have learned, discuss, solve problems in groups, etc. This type of approach allows two important things to be combined: on the one hand, to be able to advance in the program without losing time, and on the other hand, for students to work actively and do exercises that help them to increase their understanding under the supervision of the teacher.

The interest in flipped-learning methodologies is growing day by day, as indicated by the almost 30,000 educators from all over the world already registered at the Flipped Learning Community Network. In the specific case of Biochemistry and Metabolism, the work done by Professor Brent Stockwell is especially noteworthy. Since he joined the Columbia Center for New Media Teaching and Learning (CCNMTL) in the summer of 2013, he has been teaching Biochemistry with inverted class methodology.

## 2. Collaborative Learning

Collaborative learning is grounded on social constructivism, which considers learning a social process that is built not only with the teacher, but also with peers, the context and meaning of what is learned. This learning approach not only favours the academic performance of students but also allows them to acquire important transversal competences that are very useful in their professional development. An efficient collaborative learning approach is characterized by the following five features [7]: a) Positive interdependence. b) Individual and group accountability, to avoid free-rider effects [8]. c) Promotive interactions. d) Appropriate use of social skills. e) Group processing, with critical self-evaluation of the work carried out within the group. In the specific case of the learning-teaching of Biochemistry, the opinion of teachers and students in relation to the implementation of collaborative learning methodologies is, in general, very positive [9-13]. Having said all this, it should be noted that collaborative learning is an appropriate method to achieve certain skills, achievements or goals, but it does not work for everything (and not everyone is well adapted to this way of working).

Thus, there are situations in life where we are forced to compete with others; for example, when we apply for an interview to get a job, or when we are looking for the best mark in a competition to get a position. Having clear ideas and demonstrating autonomy in the use of specific skills are factors that, depending on the circumstances, can also be highly valued in the field of work. Therefore, in reality, all students should be taught to acquire individualistic, competitive and collaborative skills in a balanced way.

In this sense, too, collaborative learning cannot be seen as a substitute for lectures or other traditional methods of classroom interaction but, as even its most ardent proponents believe, a useful complement. However, effective collaborative learning application demands new skills and more effort from the teacher than giving master classes. Furthermore, many teachers find it difficult to use this model of collaborative learning without affecting the projected syllabus for their subjects. These problems could be alleviated by associating the collaborative learning with methodologies that, like those of flipped learning, allow "gaining time" without sacrificing content.

## 3. Problem-based Learning

The first uses of problem-based learning (PBL) date back to the 1960s, when the faculty of McMaster University in Canada observed the lack of health problem-solving skills of their graduate students, despite the extensive knowledge they had acquired throughout their curricular studies [14]. PBL thus emerges as an alternative

methodology, which emphasizes that students take a more active part in their learning process, with the teacher playing a mere "facilitator" role. From the beginning, defining exactly what PBL means has been a difficult and sometimes controversial task, which even led one of the greatest specialists in this educational strategy, Howard S. Barrows, to carry out a taxonomic study on the types of PBL that would help to clarify the different uses and objectives of this then novel and innovative educational strategy [14]. A decade later, Gallagher *et al.*, [15] set the parameters that, in their opinion, an education strategy based on PBL should have: (i) start by establishing a complex or insufficiently structured problem; (ii) use the problem as an element to organize the learning agenda; and, (iii) the role of the teacher as a meta-cognitive tutor. This is one of the first contributions that defines what the teacher's framework of action should be as a guide rather than a source of knowledge. Two of the first in-depth literature reviews on PBL should be underlined [16, 17]. Although the PBL approaches had their origin and greatest development in the area of health science [18], they have been extended to other natural and social sciences [19, 20]. PBL can be used as a powerful strategy of collaborative learning. However, the lack of a sufficient number of cases or projects to be applied to teaching by means of this tool is a fact, accentuated in the case of one of the most complex topics of study for the student of Biochemistry such as the regulation of the metabolism and its integration [21]. This encourages not only collaboration in increasing the scarce teaching resources available to the educational community, but also the application of some of the guidelines of educational research focused on design with implementation and evaluation to be carried out with university science students, through case studies [21-25].

## 4. Our Experience of Collaborative Learning and Class Inversion to Study Metabolism with the Aid Of PBL

Biochemistry (and, in particular, metabolic regulation) is perceived by students as a very demanding and difficult discipline [26]. This means that many students show a certain detachment that translates into a delay in facing their study, even in some cases to temporary abandonment of it. In addition, the first approach to the study of Biochemistry by a large number of university students is superficial [27]. This phenomenon, which has been relatively studied in some countries and referred to mainly in the Anglo-Saxon specialized literature [28,29], does not seem to have a more local counterpart in terms of its problems in Spanish universities. In spite of the periodic meetings held by specialists in the workshops on Biochemistry Teaching, organized by the Spanish Society of Biochemistry and Molecular Biology (SEBBM), there are almost no relevant studies published on the nature and scope of this learning difficulty. On the other hand, the almost always exclusively "scientific" training of this teaching staff, with a pedagogical training exclusively fed by years of practice, marks the bias of the development of the designed and applied teaching tools, without making the approach and rigour that quality educational research requires and without a real evaluation of their scientific impact [30].

The use of PBL for the learning-teaching of biochemistry is still very restricted in comparison to the classical teaching of this subject, judging by the limited bibliography that can be found on the subject [31]. Furthermore, this strategy has been distorted over time, leading to a simple case study approach [32]. Some authors believe that its poor implementation is comprised mainly by the lack of conviction of teachers and institutions, the poor supervision and evaluation of the specific curriculum for PBL, as well as by the lack of confidence in the knowledge that students acquire or the motivation of educators, thus hindering the great potential that this educational strategy can have [33]. In spite of these problems and limitations, we are confident that the preparation of new problems

or cases on regulation of the metabolism could help to achieve one of the teaching objectives most desired by teachers of this discipline, which is a more integrated vision of the knowledge that their students acquire throughout the course [21, 34].

## 5. Some Preliminary Results

If Biochemistry is a very demanding and difficult discipline for science students, learning about the metabolism, its regulation and integration is one of the most complex topics of study for biochemistry students [35]. Since years ago, we are using collaborative and flipped learning strategies to increase the role of our students in the process of their own learning [36]. To achieve this aim, our use of PBL has been essential [37]. Flipped learning application leaved us time to introduce both virtual and face-to-face collaborative tasks. These tasks were carefully designed as to boost co-operative attitudes among students, and they fulfilled the five essential requirements for an efficient co-operative learning mentioned above [7]. We used the framework of a learning contract, which revealed to be a very efficient tool to increase our student's loyalty to the subject (and hence to increase their attendance to exams). The flow chart of our use of PBL for the collaborative learning-teaching of metabolism has been previously published [37]. Enrolled volunteer students of our two courses on "Regulation of Metabolism" (Grade of Biochemistry) and "Metabolic Regulation" (Grade of Biology) were organized in groups of 3-4 students. All the groups received a document containing a set of instructions and rules to solve the "case", along with all the tasks included the case. Each group could freely decide how to share the tasks and to organize the complete work of the group. Groups were allowed to work around the case for two months. During this period of work, groups were allowed to demand tutorial sessions and guidance from their professors. At the end of this working time, each group should prepare a final report clearly describing the response provided to each task. In the final report, members of each group should add a public declaration of engagement, with mention of the specific work carried out by each member of the group in the resolution of the overall case. Up to now, we have developed extended PBL cases to guide our students' self-learning of important blocks of the contents of a Metabolic Biochemistry such as the regulation of glycogen metabolism, the four Krebs cycles and OXPHOS. In the moment in which this contribution was written, the COVID-19 outbreak had produced in our University, as in many others around the world, a transitory change from face-to-face classroom classes to a 100% virtual teaching. Under these conditions, the previous implementation of flipped learning, collaborative learning and PBL in our Metabolic Regulation courses has greatly contributed to a softer transition, which has been welcomed by our students.

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# Classification Systems of Visual Representations Included in Biology Textbooks

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## Abstract

*During the last 4 decades different classification systems have been developed in order to sort visual representations into categories and subsequently study their effectiveness in learning. In the international literature, various criteria are used in order to classify the visual representations. Some classifications are based on the function of the graphic, while others rely on the degree of abstractness. Additional classification criteria are the level of the representation, the semantic relationship with the corresponding text and the physical integration in the text. Although researchers often use the same classification criteria, they, however, tend to use different terms for similar thematic categories. This may lead to confusion that makes analysis of the visual representations more difficult. In the present study, systematic bibliographic research was carried out in order to collect and organize the different classifications employed in the analysis of visual representations included in biology textbooks. Subsequently, qualitative analysis of the content of the classification systems was conducted in order to identify common features as well as semantic differences and produce a novel more sophisticated classification framework for the study of the visual representations.*

*Keywords: visual representations, biology textbooks, classification framework*

## 1. Introduction

Images have a central role in modern societies. Visual representations have an important contribution to communication in scientific communities and consequently in science education. [1] The increased use of visual representations in textbooks in recent years reflects their growing importance in educational contexts as they are a significant learning resource. [2]

Visual representations are an integral part of high school science textbooks and play an important role in understanding the concepts of Biology. [3] Their major contribution in learning and teaching is the construction of meaningful mental models or internal representations of biological concepts and phenomena. [4] A variety of visual representations that can be interpreted by students in different ways have been found in science textbooks. [5] Learners can better understand a biological concept when it is presented in multiple visual representations as each one of them focuses on different information and details. [6] Presenting a biological concept or phenomenon by using different types of visual representations contributes to understanding its various parameters and results in a more effective learning process. [5, 7, 8]

The visual representations that are present in biology textbooks can be sorted into categories according to various criteria resulting to different taxonomies. In many instances, researchers use the same classification criteria with different terms for similar

thematic categories. [9] This leads to confusion that makes analysis of the visual representations more difficult. A synthesis of existing classifications, via careful comparison, could overcome this problem.

The present study aims to review the existing classifications of the visual representations used in biology textbooks in order to examine the possibility of integrating them.

## 2. Methodology

A systematic bibliographic research was carried out in order to collect and organize the classifications employed in the analysis of visual representations included in biology textbooks. Subsequently, a qualitative content analysis of the classification systems was conducted in order to identify common features as well as semantic differences and produce a novel more sophisticated classification framework for the study of visual representations.

## 3. Results

Researchers employ several terms when referring to visual representations. Some of the most commonly used terms are representations, inscriptions, visual displays, graphical displays, graphical representations or simply images. [10] An attempt to produce an integrative organization of the numerous existing classification categories can be based on the use of specific classification criteria. The three criteria employed in the current study are function, form and level of representation

### 3.1 Function of Visual Representation
Many researchers classify visual representations according to the function they are intended to serve (Table 1). The taxonomy presented in Levin *et al.*, [11] includes five categories of visual representations namely decorative, representational, organizational, interpretational and transformational.

The term "decorative" refers to graphics that do not meaningfully support the text and mostly serve the function of adding an affective component.

The "representational" function [11] characterizes graphics which are strongly related to the text they support, showing exactly what is referred in the text and thereby add an element of concreteness. In subsequent works [10, 12] the term "analytical" was employed to describe visual representations that either depicted an object or entity without elaboration as well as graphics with explicit labelling or other devices showing parts. It is thus deduced that the terms "representational" and "analytical" refer to similar function and may be treated as equivalent. In the later work of Wiley *et al.*, [13], the "analytical" functional category was subdivided into two distinct functions which are referred as "depictive" and "deconstructive". The term "depictive" refers to graphics that only present an object without any other explanations or labels, while the term "deconstructive" refers to depictions that present the components of an object and their in-between relationships.

The "organizational" function [11] refers to graphics which organize the information and components they contain thereby providing cohesion. In later works [10, 12, 13], the term "classificational" was employed for visual representations that show the relationship between the exhibited objects or represent a taxonomy. It is thus deduced that the terms "organizational" and "classificational" refer to similar function and may be considered equivalent.

*Table 1. Classifications based on the function of the visual representation*

|   | Levin, Anglin, and Carney (1987) | Kress and Van Leeuwen (1996) Dimopoulos, Koulaidis, & Sklaveniti, (2003) | Wiley, Sarmento, Griffin, & Hinze (2017) |
|---|---|---|---|
| A | Decorative |  |  |
| B. | Representational | Analytical | Depictive |
| C. |  |  | Deconstructive |
| D. | Organizational | Classificational | Classificational |
| E. | Interpretational | Narrative | Explanative |
| F. | Transformational | Metaphorical | Metaphorical |

The "interpretational" function [11] refers to graphics that provide more information than the "organizational" and which are used for describing more difficult or unfamiliar concepts, objects or phenomena. In later works, the use of the terms "narrative" [10, 12] and "explanative" [13] refer to graphics that depict causal or logical sequences, or processes of change, with action often visualized by arrows in order to illustrate technical or natural processes. It is thus deduced that the terms "interpretational", "narrative" and "explanative" refer to similar function and may be treated as equivalent.

Finally, the "transformational" function [11] refers to graphics that attempt to recode into a form that it is easier to remember. In subsequent works [10, 12, 13], the term "metaphorical" was used to "connote or symbolise meanings and values over and above what they literally represent" [10]. It is thus concluded that the terms "transformational" and "metaphorical" refer to similar function and may be considered to be equivalent.

### 3.2 Form of Visual Representation (Degree of Abstractness)

Another principal criterion employed for the classification of visual representations is the degree of abstractness (Table 2). This refers to the amount of information that can be summarized in an inscription and the degree of similarity to the object or the phenomenon it represents.

The first category consists of the least abstract visual representations that bear a strong resemblance with the original object or phenomenon. Several different terms have been employed for characterizing the visual representations holding this form and may be considered to be equivalent: iconic diagrams [14], realistic (embodied by photographs and drawings) [12], Photographs/naturalistic drawings [3] and illustrations (embodied by photographs, technical images and drawings). [15]

The second category refers to visual representations holding a higher degree of abstractness. The different corresponding terms employed in the literature are schematic diagrams [14], conventional [12], maps and diagrams [3] and visual or verbal diagrams (embodied by several types of representations shown in Table 2) [15]. The conventional form includes a wide spectrum of representations which covers the ones that belong to the third category as well.

The third category refers to visual representations holding the highest degree of abstractness and show the numeric or quantitative relationship between represented variables. The different corresponding terms employed in the literature are graphs and charts [14], graphs, tables and equations [3] and quantitative representations [15].

Finally, a fourth category refers to visual representations that involve elements that mix the first category with at least one of either the second or the third category and they are known as hybrids [12].

*Table 2. Classifications based on the form of the visual representation (degree of abstractness)*

| Hegarty, Carpenter, & Just (1991) | Dimopoulos, Koulaidis, & Sklaveniti (2003) | Pozzer & Roth (2003) | Postigo & López-Manjón (2015) | |
|---|---|---|---|---|
| Iconic diagrams | Realistic (Photographs, drawings) | Photographs | Illustrations | Photograph |
| | | | | Technical image |
| | | Naturalistic drawings | | Drawing |
| Schematic diagrams | Conventional (Graphs, maps, flowcharts, molecular structures and diagrams) | Maps, Diagrams | Visual diagrams | Structure diagram |
| | | | | Process diagram |
| | | | Verbal diagrams | Concept map |
| | | | | Table and layout |
| Graphs, Charts | | Graphs, Tables | Quantitative representations | |
| | | Equations | | |
| | Hybrids | | | |

## 3.3 Level of the Representation

Visual representations in biology textbooks may be classified according to the domain specific criterion related with the level of the representation. The macroscopic level refers to biological entities which are visible to the naked eye. Subsequently, the cellular or subcellular (microscopic) level refers to entities that are visible only under some type of microscope. The microscopic level is followed by the molecular (or sub-microscopic) level of representation at which macromolecules such as DNA or proteins may be "visualized" via different analytical techniques (e.g., electrophoresis, analytical centrifugation, X-ray crystallography). Finally, the symbolic level of representation refers to explanatory mechanisms of phenomena represented by symbols, formulas, chemical equations, metabolic pathways, numerical calculations, genotypes, inheritance patterns or phylogenetic trees. [7]

## 4. Conclusion

The analysis undertaken in the current work led to the identification of common as well as unique features among the existing classification systems available for the study of visual representations present in biology textbooks. It resulted to the proposal of more cohesive classification tools which are based in different classificational criteria related to distinct attributes of the visual representations.

Future work will involve the application of these classification tools for the detailed analysis of visual representations related with specific biological themes in biology textbooks used in different educational levels.

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# Development and Manufacturing of an Interactive Three-Dimensional Phase Diagram of Carbon Dioxide for Teaching Sessions in Thermodynamics

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## Abstract

*The p,v,T-phase diagram shows the correlation between the thermal state variables pressure p, specific volume v and temperature T of a certain substance in a three-dimensional plot. Experience showed that many students have difficulties to recognize the derivation and meaning of the three-dimensional phase diagram and its projections. For explaining these phase diagram to the students in a more illustrative and clear way, a special 3D- model for teaching purposes was developed and manufactured. The main objective was to improve the students understanding of complex basics in thermodynamics. Therefore, literature research was done about relevant thermodynamic information of the phase diagram and also topics of physics didactics for getting a better understanding about the effect and arrangement of media in teaching sessions. Creativity techniques were used to develop a concept for the construction and design of the model. Important requirements like portability, durability and clearness were taken care of during this process. By using a computer-aided design (CAD) software a digital reproduction of the p,v,T-phase diagram of carbon dioxide was constructed as a basis for the following production process. Inserting several working screens into the model allowed a division in smaller segments. These segments were printed as hollow bodies by a 3D printer. Small magnets were used for the cohesion between the segments. The main advantage is the possibility to separate and assembly the segments again and again like a puzzle very easily. In addition, a casing was built of plywood panels and acrylic glass for transportation and as an area for the three different projections of two-dimensional diagrams. The projected curves were highlighted by cables fixed onto the acrylic glass allowing to switch illumination of each single line. In case the projection areas would be removed the tree-dimensional phase diagram with its different phase regions and binodal are visible directly. The model can easily be cut open in several levels or certain areas can be taken out for presentation. The designed model was resulting in a significantly better understanding of thermodynamic lectures and turned out to be very useful in an educational film for home-schooling during Corona pandemic.*

*Keywords: phase diagram, thermodynamics, teaching sessions, 3D printing*

## 1. Aims of the Project

The p,v,T-phase diagram shows the correlation between the three thermal state variables pressure p, specific volume v and temperature T of a certain substance in a complex three-dimensional plot. Experience showed that many students have difficulties to recognize the derivation and meaning of the three-dimensional phase diagram and its projections. These two-dimensional projections are often used in literature and in

thermodynamics lectures. For explaining these phase diagram to the students in a more illustrative and clear way, a special 3D-model for teaching purposes was developed and manufactured. The main objective was to improve the students understanding of complex basics in thermodynamics. As part of the bachelor thesis a student of mechanical engineering took part in the project as well. The idea that students during their bachelor projects help inventing solutions for next generation of students turned out to be very successful: On the one hand the involved bachelor student knew the typical difficulties of beginner students from personal experience and got an interesting and challenging bachelor project on the other hand [1].

## 2. Analysis and Research

As first step literature research was done about relevant thermodynamic information of the phase diagram and thermodynamic basics like thermodynamic equilibrium [2], state variables [3], Gibbs' phase rule [4] and properties of ideal [3] and real gases [5].

For getting a better understanding about the effect and arrangement of media in teaching sessions research was also done about topics of physics didactics like innovative media in teaching sessions (objective, iconic and symbolic media) [6]. The mechanisms of students' perception and different levels of memory (sensory memory, short-term memory, long-term memory) were analysed as well [6]. The processes of information recording and preattentive perception (laws of proximity, closeness, similarity and experience) got researched to be considerate in the development process [6].

## 3. Development of a Concept

Several creativity techniques were used to develop a concept for the construction and design of the model in a systematic manner. For getting an overview about the requirements of the model all wishes were listed. Main identified requirements were for example portability, durability, costs, visibility, content, similarity to literature, 2D-projections shown clearly, isolines visible well, binodal and phase areas easily recognizable. The model should be able to be broken down into segments for presentation of certain areas and the isolines inside.

For generating many different ideas, the brainstorming method, the Disney method and the Imagine method were used. Rating of the ideas was done using the Morphological Box [7]. All identified requirements were considered as criteria during this process. Following this systematic decision making a check for possible incompatibilities completed this process.

## 4. Modelling

First step in modelling the phase diagram was the determination of the length ratios of the 3D-phase diagram for Carbon dioxide from literature. By using the computer-aided design (CAD) software Autodesk Inventor [8] a digital reproduction of the p,v,T-phase diagram of carbon dioxide was constructed by modelling of the surfaces. Inserting several working screens into the model allowed a division in smaller segments. Attention was paid to set these slices in every striking area of the model like for instance around the critical point. The model was divided into 94 segments by using four isobars, five isotherms and five isochores as screen cuts. Next step was the generation of thin-walled hollow bodies for each segment. The three different 2D-projections were derivate from the model as well. Converting each of the 94 segments into a printable file format (.stl)

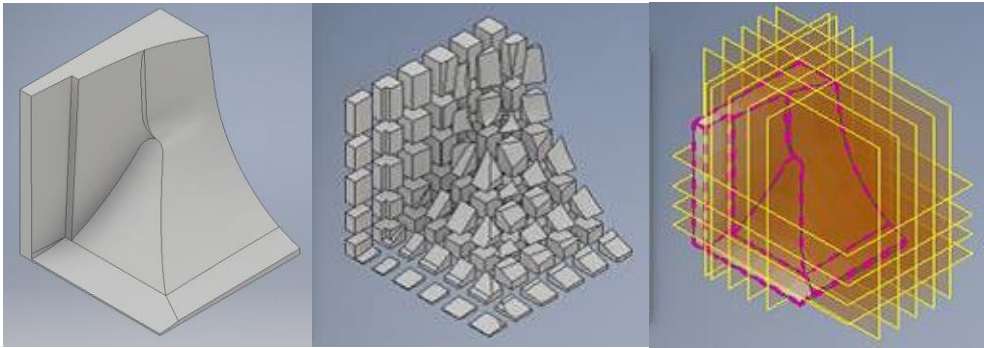for 3D printing terminated the modelling process.



*Fig. 1. Modelling of the surfaces using CAD software (left); Generation of some division planes following several isolines (middle); Generation of thin-walled hollow bodies for each segment (right) [1].*

## 5. Manufacturing of the Model

The manufacturing process was started with 3D printing of all 94 segments. These segments were printed as hollow bodies by a 3D printer using polylactic acids (PLA) [9].

The edges and surfaces were polished with sand paper by hand. For a detachable cohesion between the segments small magnets were glued on the inside of each segments [10]. For some segments special 3-D printed holding structures for the magnets were installed. The main advantage is the possibility to separate and assembly the segments again and again like a puzzle very easily.

Afterwards the printed segments were coloured and the isolines were drawn on the inside of every segment. In addition, a casing was built of plywood panels and acrylic glass for transportation on the one hand and, more important, as an area for the three different projections of two-dimensional diagrams on the other hand. The projected curves were highlighted by cables fixed onto the acrylic glass allowing to individually switch the illumination of isolines and binodal in every 2D-projection [11]. All-important lines got labelled by an erasable chalk pen. The axis labelling was printed as well with a shift of 45, so it is possible to read it easily from every angle of view.
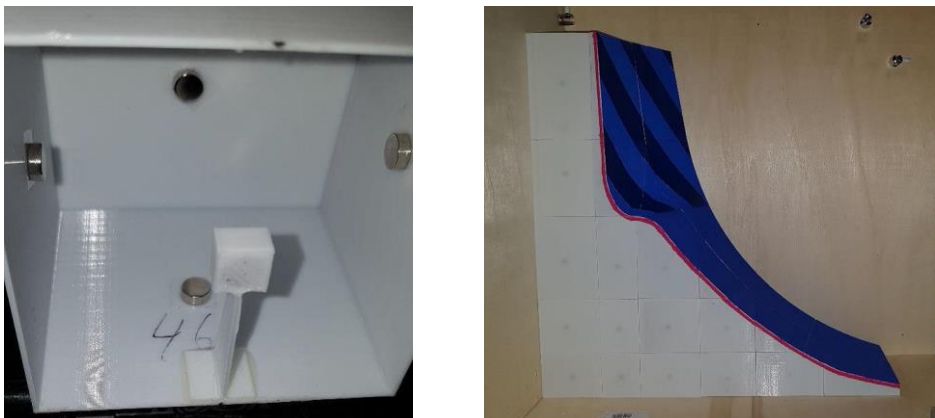


*Fig. 2. Inner side of a 3D printed hollow body of a single segment with round magnets for detachable cohesion (left); Critical isotherm on the opened model (pink line) (right) [1]*

## 6. Innovative Functions of the Developed Model and Use in Teaching Sessions

After the manufacturing process the developed model was tested in thermodynamic teaching sessions and showed many advantages: The division of the model into 94 segments with detachable cohesion between them lead to several possibilities of depiction of phase areas, isolines, binodal and the three different 2D projections of the 3D phase diagram. In case the projection areas would be removed the tree-dimensional phase diagram with its different phase regions and binodal was visible directly. The model could easily be cut open in several levels or certain areas could be taken out for presentation. In the opened model the isolines could be seen as well. The different binodal in each projection can be illuminated independently, in different colours.

Students easily understood the derivation and meaning of the three-dimensional phase diagram and its 2D-projections. Especially turning the 3D-diagram led to an illustrative understanding of the 2D-projections. Light effects helped to highlight certain lines in the diagram in lectures.

In general teaching sessions became more interactive because students were able to puzzle themselves with the model. Also exercises could be straightforwardly replicated with this model to underline the explanation of the steps towards the solution. Students were more motivated to acquire knowledge of complex issues like thermodynamics in comparison with usual courses.

The designed model resulted in a significantly better understanding of thermodynamic lectures and also turned out to be very useful in a self-made educational film for students home-schooling during the Corona pandemic in 2020.
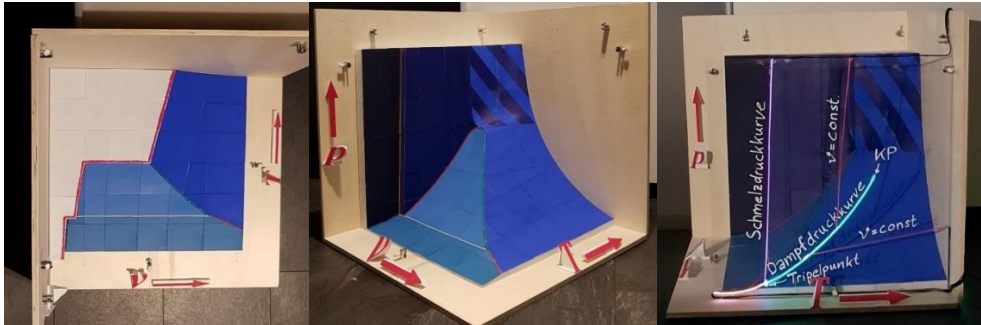


*Fig. 3. Opened phase diagram showing an isobar (pink line) in v, T projection (left); Three-dimensional p, v, T phase diagram with coloured binodal and phase areas (middle); Illuminated and labelled lines of projection on acrylic glass for two-dimensional p, T diagram (right) [1].*

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[8]    Autodesk Inventor Professional 2018 64-Bit.

[9]    Creality Ender 3 Pro.

[10]   Neodym Magnete ⌀8x3 mm NdFeB N38, Haftkraft: 1,8 kg, Hersteller: EarthMag GmbH.

[11]   Elektrolumineszenz Kabel inklusive Batterietreiber der Marke Mioke.

# Geoethics and New Medias: Sharing Knowledge and Values

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## Abstract

*Today's widespread diffusion of information and communication technologies (ICTs) has accelerated the access and circulation of information. Although relevant benefits have been produced thanks to the incredible spread and speed of information, on the other hand this speed has also enlarged the demand for content, causing a tremendous downfall in accuracy and veracity of information. This phenomenon is particularly visible in the domain of scientific journalism. To counteract this negative consequence, geoethics indicates engaging in science communication as one of the responsibilities of a geoscientist. However, even if the relevance of this duty is almost universally recognized, generally geoscientists lack the proper digital skills to effectively use new media. As most of the content shared and consumed on the internet is delivered through new platforms, we contend that geoscientists should be trained in specific digital skills in order to improve the effectiveness of their science communication. Within this study, firstly, the above-mentioned considerations will be proven discussing the current state of scientific journalism and the relevance of teaching geoethics at higher education level. Secondly, an analysis of the most needed digital communication skills for geoscientists will be conducted. Finally, building on the results reached in the previous sections, it will be presented a suggestion on the best way to include digital skills courses within the framework of geoethics and geosciences. The innovative aspect of this research lays in its multidisciplinarity, as it links geosciences, science communication and ICTs. Moreover, as training in geoethics has not been implemented in the geoscience's curricula, yet, this paper aims to spread its knowledge and provide guidelines to its implementation at Higher Education.*

*Keywords: Education, Geoethics, Digital Skills, Science Communication*

## 1. Introduction

In the midst of XXI century environmental, economic and societal challenges, multidisciplinarity should become one of the key features of current and future experts.

Complications arising from human actions upon the planet (e.g., greenhouse gas emissions, water depletion, soil over consuming, increasing population and energy demand) do not belong to a specific field of study but they touch almost every academic discipline.

In such a scenario, geoscientists, due to their knowledge and competencies, are required to play a prominent role in modern society. However, they are not always fully aware of the wide range of aspects and ethical issues affected by their job. For this reason, training in geoethics (defined as "*research and reflection on the values which underpins appropriate behaviour and practices*" in geosciences [1], [2]) should be

included across all the geosciences curricula [3]. Geoethics aims to, educating more aware, ethical and responsible geoscientists. To reach this objective, geoethics focuses on 4 groups of responsibilities [4]:

- Responsibility towards the self;
- Responsibility towards colleagues;
- Responsibility towards society;
- Responsibility towards the Earth system.

This study will mostly focus on one aspect of geoethics, falling under the third category ("responsibility towards society"): science communication.

Among the several responsibilities of geoscientists, geoethics also includes "engage in science communication and education". However, thanks to the diffusion of ICTs, scientific news is spreading faster than ever and their quality and accuracy are plummeting. "Web Churnalize" (i.e., the production of "copy and paste" articles without the exertion of proper verification) represents a particularly negative example of such trend [5]. To counteract similar cases, specific training in science communication should be imparted within courses of geosciences and/or geoethics. Such training should be devoted to teaching relevant digital skills, which have become essential to communicate effectively online, and to highlight ethical and social implications in geoscience communication.

## 2. Scientific News on the Internet and the Role of Geoethics

In the last 20 years, the number of internet users grew from 361 million to about 4.5 billion [6]. This unprecedented growth resulted in the substitution of traditional media by online content. Nowadays, the Internet represents the most prevalent source of information for many people [7]. As a matter of fact, a research conducted in 2017 has shown that in the United Kingdom more than 80% of the population between 18 and 24 years old preferred online sources to traditional media [8].

The causes of this phenomenon are varied and too complex to be extensively analysed in this short article. However, readers should bear in mind at least two relevant components of this current event:

- The ever more increasing availability of Wi-Fi connection and web browsers on multiple devices (e.g. mobile phones and tablets);
- The transition of Internet population from passive users to active members (Web 2.0).

The concomitant occurrence of these two circumstances is among the leading causes of higher demand for content on the web. As more and more people turn to blogs and other online-only media sources to satisfy their thirst for knowledge [8], considerable pressure is put on print newspapers, which are required to produce articles and content at a faster pace. Such speed decreases the time for revision, which in turn results in the phenomenon of "Web Churnalism" described above [5].

One last concern relates to how the Internet selects and presents information. Most online information providers select and prioritize content by using algorithms or audience metrics, giving more value to content that received more "clicks" or has been shared the most [7], [9]. As a final result of this alarming situation, qualified science journalists are falling short to attract attention and share their knowledge.

In such circumstances, which clearly denies ethical practices, geoethical training becomes necessary to transmit, share and put into practice the fundamental values of

all (geo)sciences: integrity, honesty, trustworthiness, accountability, accuracy and impartiality [1, 2]. However, this might not be enough. As the underlying causes of this phenomenon lie in the digital realm, geoscientists need also adequate training in relevant digital skills. Different studies claim [4, 7, 8] (geo)scientists should investigate more the possibilities opened by digital media and engage the public through their use. Some researches show that science communication skills are consistently lacking and do not reflect the needs of writing tasks outside academia [10].

## 3. Digital Skills for Science Communication

Researchers has defined a range of skills for effective use of digital means [11]. They are divided in six categories:

- Operational skills;
- Formal;
- Information;
- Communication;
- Content creation;
- Strategic.

These categories are further divided into *medium-related* (operational and formal skills) and *content-related skills* (information, communication, content creation and strategic skills). As *medium-related skills* include basic skills, they will not be discussed.

Attention will be directed towards those *content-related skills* more related to science communication and that should be taught in geosciences classes: *communication, content creation* and *strategic skills*.

### 3.1 Communication Skills

This category includes those skills needed for proper online communication. Some of them might seem trivial (the use of email, chatting, instant messaging). However, they represent a basic step in a digital communication training. In fact, every channel requires special communication skills, which are difficult to teach (the so-called "netiquette", formal online behaviours). These would include, among others: (I) the ability to attract attention online, (ii) construct online profiles and identities and (iii) the ability to adopt alternative online identities. As the internet easily hide banal content, these skills become useful for those geoscientists aiming to reach a wider public.

### 3.2 Content Creation Skills

This category includes more "technical" skills, which has become increasingly important with the advent of Web 2.0. Content creation skills refers to the mastery of every content creation ability. For instance, writing, audio recording, assembling of picture, the use of video and audio editing programs.

### 3.3 Strategic Skills

This last category is more abstract. It covers the capacity to use digital means for personal or professional goals. Strategic skills are a set of abilities that must be applied in steps:

- Developing an orientation towards a particular goal
- Taking the correct action to reach the goal
- Making the right decision to reach the goal
- Gaining the benefits that results from the goal

This category presents the last and most difficult set of skills that geoscientists engaging in science communication will need to learn. Their relevance stems from the fact that the Internet provides a wide spectrum of channels for communication (social medias, blogs, multimedia platforms). In order to reap most of the benefits, geoscientists engaging in science communication, should learn how to use these channels strategically.

## 4. Teaching Digital Skills and Geoethics

Mastery of all the above-mentioned skills would contribute to make geoscientists more capable science communicators. However, without proper training in geoethics, that would not be enough. The digital skills merely provide the mean to the fulfilment of a larger objective: the transmission of valuable knowledge and ethical values to the people. It is in this circumstance that geoethics claims its role. It provides the wider framework of action for geoscientists to act ethically, together with the values that need to be transmitted with scientific knowledge.

Teaching how to communicate science and ethical values is not an easy task.

However, to train more responsible geoscientists is a challenge that has to be faced.

Lectures teaching similar content should be practical and learner-centred. One example of good practice can be provided by the videos produced in the framework of a science communication training presented on the website *geoethics.org* [12]. Early career geoscientists produced videos, showing to have acquired the relevant digital skills listed above, together with the ability to transmit scientific knowledge and geoethical values. One last important reference is the Erasmus+ project GOAL's (Geoethics Outcomes and Awareness Learning) website [13], from which material for geoethics lectures can be retrieved.

## 5. Conclusions

In the face of current multidisciplinary challenges, ethical values cannot be dismissed, since, together with scientific knowledge, they provide us a better understanding of our role and responsibilities towards the planet. Training in digital skills is aimed at providing the adequate means to express and share such values, helping us overcome current and future challenges. This article participated to the debate by illustrating a list of relevant digital skills in the framework of geoethics, showing how the role of geoscientists is becoming increasingly important. As geoscientists responsibilities expand, so are the competencies required to fulfil them and digital skills are among them.

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# Learning Circular Bio-economy by Hands-on Science Experiments

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## Abstract

*A paradigm shift towards a new industrial policy aimed at sustainability and innovation is underway in Europe. Circular Economy and Bio-economy are models to rethinks the systems of production-consumption to create a waste-free future, a paradigm shift towards a new industrial policy aimed at sustainability and innovation. In particular, Bioeconomy comprises those parts of the economy that use renewable biological resources from land and sea – such as crops, forests, fish, animals and micro-organisms – to produce food, materials and energy through innovative technologies. This transition requires a cultural and structural change that can be obtained by aligning the educational programs in order to train skilled people needed to build a sustainable bio-based industry in Europe. As concern secondary schools, a promising way to introduce the Circular Bioeconomy concepts is to link them with some topic's addresses by STEM disciplines, within the ministerial educational programs. In the present work, we present a learning pathway, designed for High schools, useful to introduce the basic concepts of the bioeconomy among youngsters and new career opportunities. The designed pathway was developed within the BBI-UrBiofuture project and is composed of lectures and hands-on activities. The lectures are aimed to explain the role of science within the transition from carbon economy towards Circular Bioeconomy. Hands-on activities are practical examples of Circular Bioeconomy linkable to ministerial high school curricula, suitable to be proposed to the middle and high school students. In particular, they are laboratory experiments, demonstrating how to transform some biomasses into new bio-based products. The main objective of these experiments is to show students that the bio-industry sector needs scientific knowledge, critical thinking and creativity.*

*Keywords: Circular Bioeconomy, High School, Laboratory Experiments, Bio-based products, Cross-curricular learning*

## 1. Introduction

Our dominant economic model is still based on the logic of "take-make-waste", and this is one of the main reasons for our current sustainability problems which imply global climate change, ecological disasters, increasing stress on non-renewable resources, geopolitical tensions and social inequity. [1] Within this framework, Circular Economy and Bio-economy have been recognized as strategic and economic models for a Sustainable Europe due to their sustainability, inclusivity and resiliency to climate

change. [2] In particular, the bioeconomy is one of the largest and most important sectors in Europe, employing over 18 million people, and connecting those economic activities that use renewable bio-resources of soil and sea – such as crops, forests, animals and micro-organisms – to produce food, materials and energy. [3] The bioeconomy is not properly a new sector, but currently, it's cutting across many existing sectors with the aim to create new value chains. [4]

The transition towards circular strategies requires a cultural and structural change that can be obtained by aligning educational institutions to provide programs in order to train the skilled people needed to build a sustainable bio-based industry in Europe. In fact, in the report "A roadmap to a thriving industrial biotechnology sector in Europe" (2015) [5] identifies that the availability of skills and high-qualification staff as one of the main barriers affecting industrial biotechnology opportunities in Europe. Furthermore, the report highlights that the lack of skills is a handicap to drive the sector forward. In order to maintain Europe's competitiveness in industrial biotechnology, it was pointed out that there is a crucial need to identify skills gaps and how these can be filled. This aspect is still pending as, in order to speed up innovation, the current European bioeconomy scenario crosses the boundaries between existing and new industrial sectors and involves partners in a variety of fields entailing working in areas where different academic disciplines cross paths and in diverse teams.

Nowadays, the bioindustries are quickly evolving, and the educational systems showed some gaps and mismatches, leaving not only a youth workforce not trained for this sector, but also giving non-proper opportunities to those already working that wanted to update their knowledge. The education in science, technology, engineering and mathematics (STEM) disciplines is a key-point to fill the gaps mentioned above; therefore, special approaches for attracting youth to STEM disciplines are needed.

In this scenario, the Bio-based Industries Joint Undertaking partnership funded the UrBIOFuture project [6, 7] to help Europe to gain leadership in the bio-based sector. By identifying education needs and gaps in Europe's bio-based sector, and by involving all stakeholders in a co-creation process that delivers the "UrBIOfuture experience" as a pivotal tool for attracting talent and providing professional orientation. Thus, several workshops focused on Circular Bio-economy were set up and organized for students of High Schools in order to promote interaction among industry and educational and research institutions.

The learning pathway proposed by the workshops aimed to link some concepts of circular bioeconomy with the ministerial programs of chemistry, biology and technology.

The two main objectives were the following: (a) to aware youngsters about the Circular Bioeconomy; (b) to interest youngsters to address an educational career towards circular bioeconomy by showing them that the bio-industry sector needs scientific knowledge and creativity.

## 2. Methodology

### 2.1 Sample and Procedure

The main aim of the workshops was to link the bio-based issues with the STEM disciplines defined as crucial enabling technologies offering skills and solutions to increase the Circular Bioeconomy approach in our society.

The learning workshops' contents and the eventually previous knowledge needed, had been discussed before with the teachers in order to link it with the national school programs and consequently raise their interest.

From the practical point of view, the workshops were organized in two sessions as described below.

The first session mainly consisted of a frontal lesson dedicated to an introduction about Circular Economy and Bio-economy as strategic economic models for a Sustainable Europe.

The aim was to point out that transition towards a circular bio-economy leads to more sustainable resource use while developing new income streams, favouring the growth of new sectors, adding value to products and increasing jobs.

The second session was organized following a learning-by-doing method. Some practical examples of Circular Bioeconomy were shown. The purpose of this phase was to demonstrate that the Bio-Industry sector requires knowledge and creativity to develop new value-chains and to establish new cross-sector interconnections. Therefore, the students were involved in some hands-on activities, that can offer them some examples of how to transform biomasses into new bio-based products. The hands-on laboratory activities have been all designed to support further learning about critical concepts of circular bioeconomy and how to links different values chains, i.e., by transforming biomasses (wool and milk) into new bio-based products, such as respectively, soap and filter for water purification (Fig. 1(A) and 1(B)), and bioplastic and flexible films (Fig. 1(C)).

Along the educational pathway, the students were stimulated to work in a group with minimal guidance (student-centred learning), and they were encouraged to acquire knowledge through active exploration of real challenges (project-based-learning).
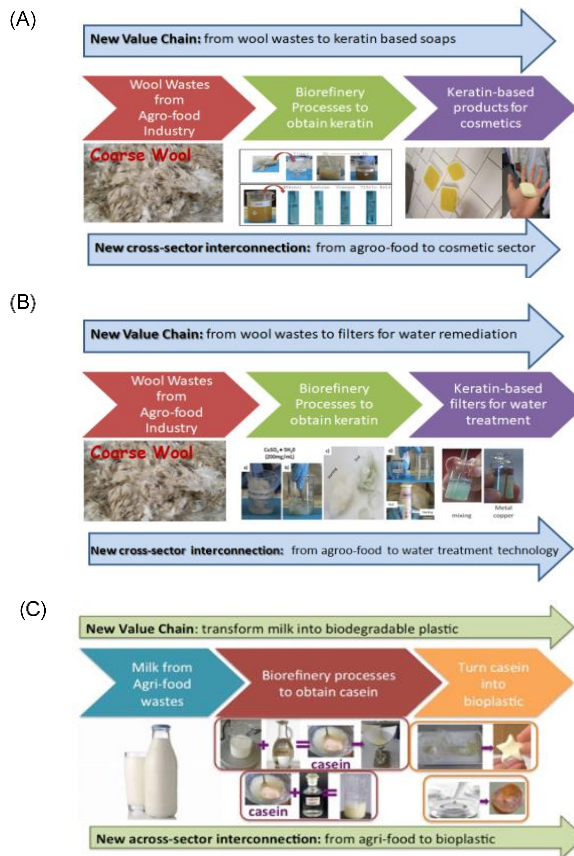


*Fig. 1. Schematic descriptions of hands-on laboratory activities and their connections with critical concepts of the circular economy*

### 2.2 Impact Assessment

In order to evaluate the impact of these workshops, a short survey has been given to the students before and after the workshop. 131 students of high school (15-18 years old), divided into 9 classes with different curricula addresses, from humanistic to scientific and to more technical curriculum, were involved in this study.

The aim of the survey was to evaluate the awareness of students about the Circular Bioeconomy as an economic model to address the problem of Climate Change and to investigate about their interest to address an educational career in the field of Bioeconomy.

A brief questionnaire has been given to the students to evaluate their knowledge before and after learning workshops (Table 1).

*Table 1. Questions contained in the survey and asked students who participated in the workshops on Bioeconomy*

| Questions before the workshop | Questions after the workshop |
| --- | --- |
| Have you ever heard about the problem of Climate Change? | Do you think that the workshop has clarified the concepts of Circular Economy and Bioeconomy? |
| How may you define Circular Economy and Bioeconomy? | Would you address your educational career towards the bioeconomy after attending the event? |
| Have you ever heard about the Bio-based sector and new career opportunities in this sector? | |

## 3. Results

The overall results are that all students are fully aware of the global climate change problem. This topic is addressed in depth at school within the disciplines of chemistry, physics, geography and technology. Nowadays the climate change is considered to have a significant impact on their life and planet, and the students discussed a lot about it also on social media. Many of them followed the "Fridays for future" movement, which organized some global demonstrations to demand action from political leaders to take action to prevent climate change and to transition to renewable energy.

However, before the workshop, only the 25% of the students were able to define the concepts of Circular Economy, and Bioeconomy (Fig. 2) and only the 31% of them have heard about the bio-based industry sector and were aware that this is a growing sector in which a significant increase in the employment level is expected.

After the workshop, the number of students able to define the circular economy and the bioeconomy increased to 78%, but only the 28% of them showed interest in addressing the educational career towards the bioeconomy.

The students most interested in addressing career in the bio-based sector were those from a Technical Technological Institute, followed by those of the Commercial Technical Institute and the Scientific High School. As expected, the less interested in addressing a career in this sector resulted in being the students of Human Science.

Moreover, the majority of students appreciated the proposed hands-on activities, since they found the laboratory experiments very useful to understand the role of science on the Circular Bioeconomy.
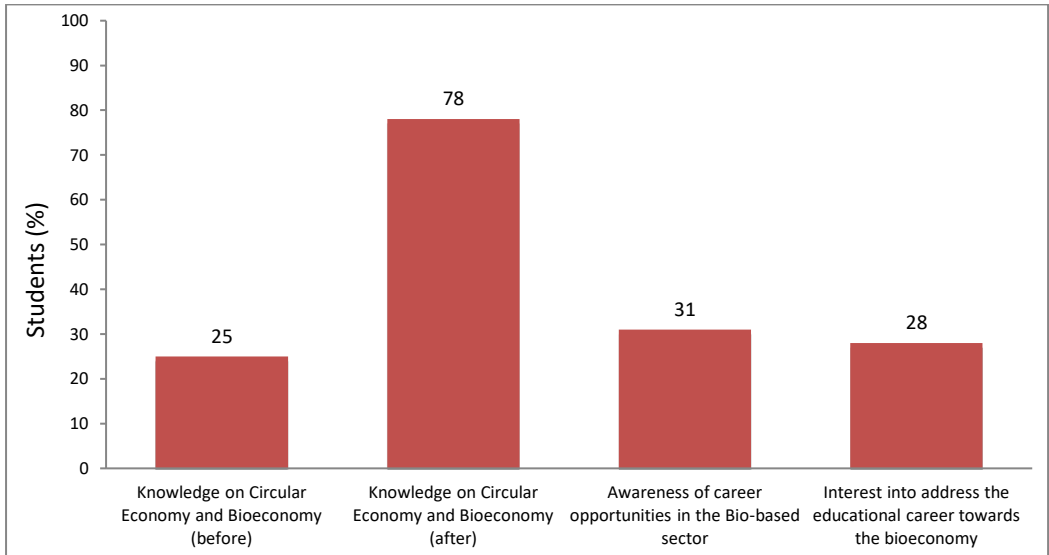
*Fig. 2. Results from the students' survey*

## 4. Conclusion

In order to boost the emerging bio-industry sector, an alignment of the educational programs is needed at all educational levels. Is for that reason that is fundamental to train young people for the new professional figures that are emerging in this sector, as well as for other professional profiles that we still don't know. That's why the coordination between educational institutions and bio-based industries is highly needed.

In this scenario, introducing the concepts of the Bioeconomy into the programs of the STEM disciplines, mainly through hands-on laboratory activity is a functional approach both to foster young people to undertake training in this area, and to develop critical thinking, a precious skill considered fundamental not only in this sector but also in other sectors where innovation and customer approaches are getting more and more important.

### *Funding*

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# New Learning Models and Modern Educational Trends for the Future of Education

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*Yambol Regional Historical Museum, Bulgaria[3]*

## Abstract

*The report aims to present the role of universities in creating and validating the new educational paradigm – from accredited qualification to certified skills. The practical implementation of this educational paradigm is presented, based on the experience of the University of Library Studies and Information Technologies (ULSIT), Sofia, Bulgaria and through the introduction of new approaches in the education of students, doctoral students and young scientists. The sound connection between fieldwork research and training in a modern university information environment is consolidated in the implementation of the so-called 'Learning by Doing' approach, which provides young people with the opportunity to practice in real environment the knowledge they have acquired during their university studies. In 2019 this approach was successfully applied in the training of ULSIT students and tested in fieldwork when an interdisciplinary study was conducted, which made use of the opportunities of information and communication technologies in the process of searching for immovable cultural values. Characteristic of this approach is the application of GIS programmes in archaeological research, which allow for rapid and accurate localization of archaeological sites. As a result of its implementation in the training of students, a more in-depth study and knowledge of the existing archeological sites was achieved and at the same time a new type of methodology for discovery, research, conservation and promotion of new discoveries was tested. From this point of view, new approaches in research are a modern way of training students and doctoral students in various fields of science and practice. The synergy between traditional education and innovative approaches proves the effectiveness of the application and use of alternative educational models, which led to the formation and establishing of the new educational paradigm.*

*Keywords: training, education, approaches, learning by doing, ICTs, archeology*

## 1. Introduction

The dynamics of social processes over the past two decades has increased people's need for new knowledge and has led to the necessity of acquiring qualitatively new skills and competencies. This need has directly and indirectly affected one of the most important areas of human development, namely higher education. Although universities have changed significantly over the years, they have retained their initial purpose as educational and cultural centres, where the average person can acquire important knowledge and skills for life. [7]

Universities are unique institutions that in an unusual way combine traditional techniques and methods of knowledge transfer with modern and innovative approaches to acquiring valuable skills. [10] That is why educational institutions are now facing new

challenges and problems related, on the one hand, to the access and quality of the offered services, and on the other, to the motivation of young people [8] to acquire new knowledge and skills.

## 2. Exposition

Building a more educated and competent society is a complex and continuous process in which universities play a leading role. Therefore, they had to include in the learning process new research approaches and innovative solutions, in order to adequately respond to society's, need for new knowledge. In search of a solution, universities have expanded their activities and focused their efforts on building networks of knowledge and working closely with other educational, scientific and cultural institutions in order to stimulate specific scientific events and research in various fields of science. [6] Thus, a natural diffusion of knowledge, methods and knowledge between scientists and specialists on the one hand and young scientists, doctoral students and university students on the other.

As a result of all these events, it became necessary to use alternative educational models [2] in practice, which formed a different but innovative in nature educational paradigm – ***"from accredited qualification to certified skills"***. [3] The new educational paradigm started to be successfully applied on the basis of the principle ***"Learning by Doing"***, which includes interdisciplinary approaches in the research and pursuit of new knowledge and their hands-on testing. In this way, a synergy was achieved between the theoretical and practical training of young people and their motivation to participate in the processes of public importance was stimulated.

### 2.1 The Knowledge Triangle

The University of Library Studies and Information Technologies (ULSIT) is one of the most modern educational institutions in Bulgaria, which successfully combines traditional teaching methods with innovative approaches to stimulate the scientific interests of lecturers, students, young scientists and doctoral students in various fields of science.

This was made possible by the fact that ULSIT took actions to build the so-called "knowledge triangle" [9] by introducing the necessary reforms in its policy and reorganizing its educational, scientific and administrative area. By applying interdisciplinary approaches in conducting field observations and research in various fields of science, young people gain knowledge, create useful connections and contacts between them and representatives of scientific, educational and cultural institutions, acquire useful communication skills, navigate through the mechanisms for work and control in state and business structures, etc.

By combining theory and practice, ULSIT has achieved a higher quality of education.

### 2.2 The Relationship Between Education and Research

The stable relationship between education and research favours the process of obtaining and understanding knowledge in different fields of science. Based on this, an effective methodology for staff training has been created, which supports the diffusion of knowledge and skills in the university information environment [1], [4]. Stimulating the relationship between education and research contributes to the preservation and enrichment of the information fund of human cultural memory. The experience and practice of ULSIT regarding this clearly show that the use and application of the principle "Learning by Doing" in the process of educating young people once again proves the benefits of creating and implementing the new educational paradigm – "from accredited qualification to certified skills".

### 2.3 Interdisciplinary Approaches in Education

In contemporary educational context, a key moment is the introduction of new technologies in cultural heritage training. This complex and multidirectional process requires interdisciplinary approaches to achieve in-depth familiarity of the existing knowledge and create the necessary capacity to discover, explore, preserve and promote new findings and values.

The development of information and communication technologies favours the process of conducting specific research in the fields of science in particular, which, for a long time have followed the strictly established methodology and tools for conducting field research.

Modern information technologies are an example of the introduction of innovative approaches into the process of dissemination of knowledge about cultural and historical heritage in an information environment. They provide the variety of methods and means by which individual and societal differences can easily, quickly and cheaply be overcome. The promotion of rich cultural and historical heritage through the potential of information technologies is a proven, working formula for the proper use of technologies in the process of perception, study and preservation of cultural heritage.

For example, the introduction of Geographic Information Systems (GIS) and their application in practice has helped to carry out faster and better research in the field of cultural heritage, more specifically in the field of archaeology. Due to the fact that computer programmes and mobile devices became more accurate, the speed of recording field data has increased and the number of errors during operation was minimized. The tools available in GIS allow for fast and accurate localization of immovable cultural values. Accurate positioning of territorial boundaries helps to protect them effectively.

The search for immovable cultural values (archaeological sites) is an important element of field archaeological research. Properly considered and consciously conducted (by cultural and educational institutions) field searches can provide important scientific information and guidance for future research on immovable cultural property.

In particular, one of the good examples in this direction is the project "Application of mixed reality in the training and promotion of cultural heritage for the purposes of the university information environment" funded by the National Science Fund of the Ministry of Education and Science of the Republic of Bulgaria with Contract № KP – 06 – OPR 05/14 from 17.12.2018, led by Prof. DSc Irena Peteva; this project successfully combines and applies methods from practice in the education of students in cultural heritage. [5]

As a result of the good cooperation between ULSIT and the Regional Historical Museum Yambol, at the end of 2019 a new approach was successfully tested in the training of students and doctoral students at ULSIT in the search and documentation of cultural heritage. In the autumn of 2019 on the territory of Tundzha municipality the regular archaeological excavations were carried out – searches of archaeological sites on the territory of Yambol district, in which lecturers, students and doctoral students from ULSIT took part. [11] They were trained in a real environment on the application of various GIS applications in the process of research and documenting of immovable cultural values.

During the field archaeological excavations, a total of 12 discovered settlements were located: 3 from the Late Iron Age; 1 from the late Iron, Roman and Late Antiquity; 1 from the late Iron and Ancient Ages; 4 from the ancient era; 1 from late antiquity; 2 from the Ottoman period. The territory of all archaeological sites was traversed by GPS and the maximum number of points was taken along the borders where there was an accumulation of ceramic fragments. Thus, the area of the immovable monuments was established with relative accuracy. 18 grave mounds were registered, all of which were

marked with a GPS point. Their current condition was described, photo- and graphically documented. Field surveys require accuracy, so all preliminary information and all subsequent information obtained during field work must be processed with an appropriate GIS-based program. The development of computer technology and mobile devices allows for the collection and processing of a larger database, thus turning GIS programs into useful assistants to archaeologists. These programs allow the storage of different levels of all visual information: from topographic maps, satellite and ortho-photo images to the polygons formed during field searches. [11]

During the field research, the principle of minimalist collection of archaeological materials was followed. Only diagnostic fragments of ceramic vessels were collected: mouths, handles, bottoms and walls of decorated vessels. In the absence of such, more characteristic fragments of the mass ceramic material were collected, and the students received on the spot detailed information about the specific finds and about the subsequent process of their description and documentation.

## 3. Conclusion

In summary, the project brings together proven scientists and specialists from different fields of science, as well as students and PhD students from various specialties to build a team in order to acquire and accumulate new, rich scientific material. The development of such projects and their implementation is an innovative and modern way of learning in a real environment, where as a result of combining theory and practice young people receive and make sense of existing knowledge and can directly compare it with new knowledge acquired during research.

Thanks to the policy pursued by ULSIT, young people are given various opportunities to organize their scientific and educational activities in accordance with the curriculum, as well as with their personal interests.

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# Subatomic Physics:
# A Key Component to Secondary Education

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## Abstract

*Subatomic physics, one of the most rapidly developing research areas, studies the building blocks of our universe such as quarks and leptons. In most schools, university students can explore these exciting discoveries through up-to-date physics courses and research projects. However, secondary students around the world are not as fortunate. Mainly, material included in secondary physics courses are pre-20th century classical mechanics, which many students perceive as dry. The article demonstrates that in most countries, subatomic physics topics are placed at the end of the curriculum, as optional, if at all. At the same time, some teachers feel more confident in teaching subatomic physics versus astronomy, which is included more often. The article explores the advantages of subatomic physics being included in the secondary school curriculum, with examples from the literature review and suggestions for curriculum updates.*

*Keywords: subatomic physics, nucleus, elementary particles, cosmos*

## 1. Motivation

There is a shortage of physicists in almost all parts of the world and this situation will become more problematic in the next decade. However, subatomic physics can help excite students to study physics and physics-related fields such as engineering, especially female students who are underrepresented in physics in most countries.

## 2. Introduction

What is the origin of mass? What is the nature of the dark matter? Do neutrinos hold the key to understanding the dominance of matter over antimatter in our universe? Subatomic physicists are working to answer these and many related questions, and we may soon see a revolution in our understanding of the nature of matter and its interactions [1].

However, subatomic physics is absent from most secondary curriculums around the world. Secondary education is considered as the last formal years of education offered before the student can choose to proceed to post-secondary education. The students in secondary education are being deprived the opportunity to be a part of the subatomic physics research community. Students who express interest in subatomic physics in secondary school should have the opportunity to delve deeper into the thought-provoking topic with entry into post-secondary institutions. In secondary schools, the physics curriculum should be updated frequently hence the students are given the opportunity to learn and explore new topics. Various countries around the world have completed studies to detect if subatomic physics should be included in secondary curriculum worldwide.

In the following article, two tests performed in Europe will be explored deeper and some suggestions will be declared for secondary curriculum updates.

## 3. Subatomic Physics in Secondary Schools

In secondary schools around the world, the majority of subjects included in the curriculum to be covered, consists of updated subject areas such as mathematics, chemistry, biology, etc. Yet, studies show that the physics courses offered in secondary schools worldwide includes the same topics from the pre 20th century such as classical mechanics. For many students, these topics are dull, resulting in the students losing interest and potentially not wanting to peruse their physics education past secondary school. Physics is always being updated and refreshed, including the topic of subatomic physics. The lack of updated physics in secondary curriculums is potentially one of the factors that is affecting the low number of physics university majors across the world.

European Journal of Physics Education completed a study, "Prospective Physics Teachers' Views on Their Knowledge about the New Concepts in Turkish High School Physics Curricula", aimed at observing teacher's knowledge for different physics topics and updating the curriculum based on the results. The main goal was to investigate prospective physics teachers views on their knowledge about topics to be included in the new physics curricula, investigate the sources of their acquired knowledge about the new concepts, and to explore if there was differences in views on knowledge about these new physics concepts among prospective physics teachers of different genders, years of study and university. The teachers were advised to select subjects on which they felt most knowledgeable. In terms of subatomic physics, the study was successful. As it is known, astronomy is one of the most popular topics of physics. The results showed that high school teachers were deficient in concepts particularly related to the subjects, astronomy and sound. Before the study, the team from European Journal of Physics Education predicted that high school teachers would be more knowledgeable in subjects like astronomy and have more issues with the tougher topics like subatomic physics.

Contrary to their expectations, the teachers considered themselves as more knowledgeable in the topic of subatomic physics. The final results demonstrate that teachers have more knowledge to teach the students topics involving subatomic physics.

If teachers are knowledgeable about a subject, then they should be given the opportunity to have subatomic physics incorporated in the curriculum. This will permit teachers to educate students on the topics they have the greatest knowledge in. This will correspondingly benefit the students to better comprehend the topics. To gather additional results from the study, numerous topics involving physics were compared.

Two of the five topics revealed as most knowledgeable were concerning topics of subatomic physics. These topics are quarks and de Broglie Hypothesis. The three other concepts were related to the optics and classical mechanics, both of which are very popular in secondary schools' curriculum world-wide. The results showed 99-100% teachers said "I have no knowledge" on parallax, parsec, quasars and binary stars, compared to 43-44% who said they have no knowledge on leptons, baryons and mesons. [2] The subjects that had the higher percentage of no knowledge were in topics of astronomy the prospective teachers should be given the opportunity to teach the subjects they feel most knowledgeable in. This will allow the students to acquire a better understanding of subatomic physics.

In Canada specifically, the students who choose to have physics as their optional science course for the most part are lacking the subatomic physics aspect. Out of 13 provinces and territories, there is only four that include subatomic physics in the curriculum. When included in the curriculum, subatomic physics is never a full unit,

however only a subtopic covered in one or two classes.

When students in secondary schools have the opportunity to learn about exciting and new events in the world, they have the chance to succeed and make new discoveries.

This was proven by a group of secondary students in Ontario, Canada. Subatomic physics is included in the Ontario secondary schools' curriculum. A group of 12 students were enrolled in a physics class when they decided to form a Physics Society, the "Charging Cavaliers". They were the first team from America to win Beamline for Schools competition. The students put forward their best subatomic physics experiment and won against 178 other teams from 43 countries. The win allowed the students the opportunity to travel to Fermo, Italy and run their subatomic physics experiment at CERN, the Center for European Nuclear Research. The team's goal was to find something that particle physicists with PhDs and high-tech equipment have been unable to find after decades of searching-elementary particles that have a fractional charge. [3] The teacher that was in charge of the project said "If we do find something, we're opening a whole new door on particle physics" [3] In secondary schools, many students are very bright and have the opportunity to succeed in big ways. Physics is a very versatile topic which many can perceive as difficult. If an introduction to subatomic physics was offered in high school, then the transition to university level physics will as a result, be easier to comprehend.

Subatomic physics in high school curriculum will allow students to have more opportunities, like the Beamline for Schools competition. Young bright minds can help discover the pieces of the subatomic puzzle that are absent. One of the four provinces and territories that includes subatomic physics shows positive results from the inclusion of subatomic physics in the curriculum.

The European Journal of Science and Mathematics Education published an article that described a study that's aim was to come up with a new teaching concept for subatomic physics in schools around the world. This study was not specifically for secondary education. Subatomic physics could potentially be traced back to the fundamental interactions that began the world, therefore the topic is adequate to teach any age group. This study in particular was completed on students 12 years of age. The anticipated outcome was to derive a successful new way to teach subatomic physics that will not be perceived as challenging. The teaching concepts that were introduced was permanent model character, linguistic accuracy, and innovative typography illustrations. The study was also designed to provide students the ability to construct comprehension on their own, based on the material provided. The concepts were linked to daily life examples with the use of bright diagrams and photographs. They formed 11 key ideas to be tested. Of these 11 ideas, only two of them showed poor acceptance by the students results. The two were number XI which focused on compounds and key idea II which focused on permeant model character. [4] Overall, this poor acceptance could be avoided if the students had additional years in school. From the three key teaching concepts, two came back as successful. The typographic illustrations and linguistic accuracy lead to broad acceptance. However, the permeant model character was poorly accepted and was hardly used with problem solving questions. The results indicated that 12-year-old students have the capability to comprehend subatomic physics. This leads to the idea that secondary students are capable of learning subatomic physics in their physics classes. Secondary students learning physics already have a basic physics background from general required science courses. If subatomic physics was being taught to secondary students in a similar approach as the study, the results should be successful. The age difference between a student in secondary school and age 12 will be crucial for comprehension in subatomic physics. Secondary physics curriculum should include subatomic physics in a way that relates to subjects the students have previously learned.

## 4. Conclusion

In summary, subatomic physics is not a significant topic that is included in secondary curriculum. However, when subatomic physics is included, the students benefit greatly.

The opportunity would be there for the students to win awards with the subatomic physics community and broaden their knowledge with updated physics. The students would also have the opportunity to participate in hands on activities with subatomic outreach programs around the world. Subatomic physics is a broad topic with plenty of challenging aspects, but, if taught using the three main teaching techniques and referencing already known topics from other courses, students in secondary school can excel. The students who enjoy the topic will be motivated to deeper explore subatomic physics as they enter post-secondary education. Incorporating subatomic physics in secondary school curriculum could essentially lead a student to be the next prospect that introduces a great discovery in the subatomic physics world. We urge the education community engage in subatomic physics outreach, especially to under-represented youth groups [5], and to promote the inclusion of subatomic physics into the secondary school curriculum.

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# RM@Schools: Fostering Students' Interest in Raw Materials and a Sustainable Society

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## Abstract

*Raw materials (RMs) are essential for the production of a broad range of goods and applications used in everyday life. In particular, the accelerating technological innovation and the rapid growth of emerging economies have led to a steadily increasing demand for a great number of metals and minerals. They are crucial also for fostering the transition towards a low-carbon economy.*

*Thanks to a strategic European Partnership some learning paths for pupils aged 10 to 18 years were developed in the framework of Raw Matters Ambassadors at Schools (RM@Schools), a European project funded by the European Institute for Innovation and Technology (EIT) since 2016. These paths aim at increasing the understanding of how RMs are needed in modern society, and to make careers in RM more attractive. The RM@Schools learning integrated method enables the students to expand their background knowledge in this field outside the current curricular topics and allow interconnections with others subjects of study.*

*Several educational approaches (i.e., learning-by-doing, team working, peer-to-peer, gamification, etc.) are used to foster students' interest in science and technology, in particular in circular economy and RM-related topics. Young people are trained to become science communicators (Young RM Ambassadors), and to create a "product" that can be communicated outside of the class. This method helps students to develop skills such as creativity, critical thinking, awareness of responsibility and teamwork, as well as to improve scientific knowledge on some scientific topics.*

*The learning pathway covering the whole RMs value chain, from geology to electronic waste management, has a modular structure: (1) Lesson – introducing the students to relevant content knowledge; (2) Activity – experiments with RM-related hand-on kits; (3) Visit – to industry or research centers; (4) Create/Communicate – students are asked to communicate by creating a product designed to promote dialogue on a key message they have learnt; (5) Society – students are engaged in public events, such as science fairs, as well as in presenting their best dissemination products during an annual European Conference.*

*Keywords: Raw materials, sustainability, secondary school, cross-curricular learning, lab experiments, communication*

# 1. Introduction

In human history, every technological progress has involved the use of increasingly larger quantities and varieties of raw materials (Fig.5). The last leap occurred at the end of the last millennium with the introduction of new forms of renewable energy and with the miniaturization of electronic circuits. Many of our current technologies (mobile phones, computers, automobiles), and sources of renewable green energy (solar and wind) have become more and more reliant on metals (i.e., rare-earth-elements, indium, etc.).

*Fig.5. As technology advances, so too does the need for elements found within the earth's crust*
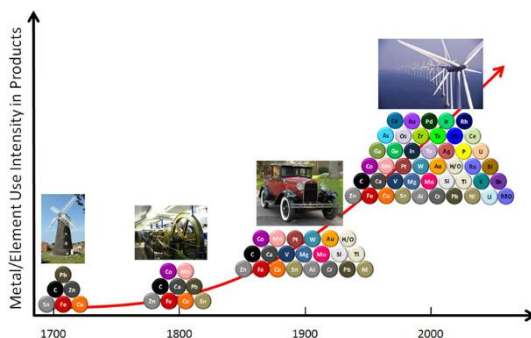


Supply problems or limited availability of these RMs can prevent the development and dissemination of renewable energy projects to address issues like climate change and transition to a low-carbon economy. The criticality of a particular material for European economy is assessed on the basis of the combination of two factors: economic importance and supply risk. Critical raw materials (CRMs) are essential for high tech products and breakthrough technologies. For example, a smartphone might contain up to 50 different metals, all of which providing different properties such as light weight and user-friendly small size.

The prospect of doubling the global resources use by 2030, the priorities are to address raw materials through the entire value chain (sourcing, use and recycling) and to foster a change of mindset in young people.

To trigger the students' interest in raw materials and a sustainable society, several learning paths for pupils aged 10 to 18 years were developed in the framework of Raw Matters Ambassadors at Schools (RM@Schools), an European project funded by the European Institute for Innovation and Technology (EIT), the largest consortium in the raw materials sector worldwide. RM@Schools was established in 2016 and became the flagship project in the Wider Society Learning segment of the EIT RawMaterials in 2018 (http://rmschools.isof.cnr.it/). It is led by National Research Council of Italy (CNR) in collaboration with partners across Europe, and it engages industry, research and education to advance knowledge on raw materials in Europe.

Different educational approaches are used to foster students' interest in science and technology, in particular in circular economy and RM-related topics.

An active learning approach is encouraged by involving students in experiments using raw material-related hands-on educational toolkits and in communication actions, but a core element of the RM@Schools approach is to empower students to communicate with peers and wider society about critical concepts related to raw

materials and their use.

Teachers can approach many topics within their curriculum using the concept of critical raw materials as a springboard. The topic of raw materials can be investigated from a science and technology perspective, but it can also be studied from a socio-political or economic viewpoint.

Raw materials are a great topic for students to investigate politics, policy, consumerism, and the interaction between economics, politics and product use and development.

Education and awareness of the uses of raw materials can lead to changes in governance as the values and the voice of citizens are listened to. We hope that students will become more responsible and active citizens when they have gained a better understanding of these complex issues.

## 2. RM@Schools Learning Paths

RM@Schools has developed learning pathways (Figure 2) where different educational approaches (such as learning-by-doing, team working, peer-to-peer, gamification, etc.) are used to generate and foster students' interest in science and technology. The learning paths are oriented toward the common goal of guiding students to create a "product" to be communicated outside of the class. By doing this, students develop 21st century learning skills such as creativity, initiative, critical thinking, awareness of responsibility and teamwork, in line with the *Entrepreneurial Skills Pass document* [1]. With the end goal of creating a communication tool targeting an external audience, students are actively involved in the learning process. Students benefit from such an approach more widely as the skills involved are increasingly viewed as important skills in the workplace. Many jobs now require creative thinking and communication skills, including positions in the world of business and science. People usually think that creativity is an inbuilt talent, but it is not entirely so. As with any skills, creativity can be nurtured in the classroom with simple strategies and practices that trigger creative thinking and provide opportunities for communicative action. Ideas generate new ideas.

*Fig. 2. The main steps of the RM@Schools learning pathway*
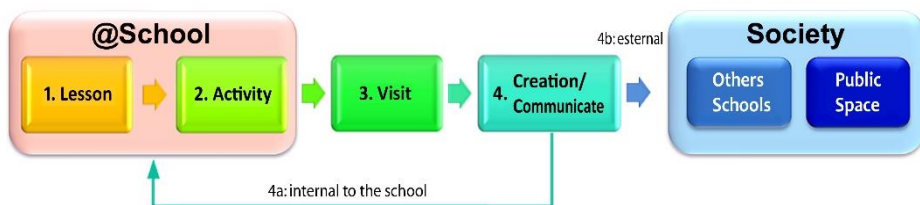


The steps of the RM@Schools learning pathway (Fig. 2) tie in with various pedagogical practices [2-4] as follows:

**1. Lesson** – It begins by introducing the students to the relevant knowledge to understand the topic. This can be done starting with a frontal lesson provided by the teacher or a guest speaker or by working with resources (active-learning), followed-up by a lesson. It should also involve a sharing of the personal experiences of the students on the lesson's topic and a final discussion. This can be accomplished by using triggers, such as the smartphone example shown earlier.

**2. Activity** – Students are then engaged in a practical activity – laboratory experiments, serious games, etc. – to support or extend their learning.

**3. Visit** – After the activity, students can also visit a place that is relevant to the lesson, so they can experience its impact in the real world.

**4. Create/Communicate** – Afterwards, the students are asked to communicate what they have learnt through the creation of a product designed to promote dialogue around a key message. This element has two major parts: (a) Create and (b) Communicate. The teacher during this phase can use a guided- or a student-centred approach. Different educational approaches such as teamwork, peer-to-peer learning, cooperative learning, and gamification can be used in order to foster creative thinking. Once students have developed a product (i.e., video, comic, poster, lab activity, etc.), they are expected to share it within their school and then in a larger community (Fig. 3).

**5. Society** – Students engagement with society can be done through participation in public events such as science fairs and festivals. Students can also choose to further engage with society through raising public awareness or taking social action.

*Fig. 3. Development of a dissemination product by a high school class in Italy*



## 3. RM@School Hands-on Toolkits

An active learning approach is encouraged by involving students in experiments using raw material-related hands-on educational toolkits and in communication actions.

These toolkits have been developed by the consortium's experts, in some cases in collaboration with schools where students have developed the lab activities as part of their practical communication action targeting their peers and society around them [5].

In Table 1 some activities available on the recycling topic are summarised.

*Table 1. Toolkits available under the theme: Recycling*

| Toolkit | Age | Learning objectives | Content | Subject links |
|---|---|---|---|---|
| **The Recycling Goose Game** | 8-13 | Students gain a deeper understanding of what can and can't be recycled, household waste segregation and recycling | Large-scale game with board pieces and cards provided for printing | Environment, recycling, materials, active citizenship |
| **Let's make recycling blue** | 14-19 | Students learn chemistry skills and separation techniques | A two-phase experiment which begins with the precipitation of Prussian blue pigment and then the filtering of metals using this pigment | Chemistry; precipitation, chelation, chemical reactions |
| **Separation of copper and iron - two approaches** | 16-19 | Students reinforce their understanding of solubility, and develop skills in reaction equations and qualitative analysis | Two separate experiments using two techniques. Good background info, clear description of what is happening, recipes for solutions provided. Questions and answers on procedure and reactions included. | Chemistry: precipitation & leaching, acids and bases, cation, anion |
| **RM & HDD** | 14-19 | Students learn how to make educational cards, practice collaboration, and design thinking | 1. Lecture on neodymium in Hard Disc Drive (HDD). 2. Multimedia materials to learn how an HDD works, and how to recover neodymium from an HDD | Technology, economics, media |
| **Recycling of silicon-based PV modules** | 14-19 | Students learn about the importance of photovoltaic (PV) waste recycling processes in the circular economy world | Lab activity: assembling and disassembling a PV mini-panel | Technology, energy saving |
| **Copper: how to recover copper from electrical circuits** | 14-19 | Students learn the fundamental role of the metal recycle and develop skills in reaction equations | An inquiry-oriented activity and 1 lab activity module to show how to recover copper from electrical circuits 1 communication activity is suggested together with evaluation grids | Chemistry, recycling, technology |
| **The rare earth elements wheel** | 10-15 | Students learn about the metal content, in term of rare earth elements, in Electric Electronic Equipment (EEE) and Waste EEE (WEEE) | One lesson on the jungle of WEEE, an exercise section about the treatment of WEEE, and an educational game | Recycling, metal proprieties and applications, environment |
| **Zinc electro – winning – From ore/scrap to target metal** | 16-19 | Students learn about mining and recycling, economic and social issues and less $CO_2$ emissions by recycling zinc | Lab activity consisting of a model experiment to understand the process chains in mining and recycling | Oxidation and reduction processes, electrochemistry, economy, social issues |

## 4. Science Communication by Students

Encouraging students to communicate within their class and to other audiences is a key part of their learning. In order to improve transversal competences (i.e., critical and creative thinking, collaboration, etc.) and promote inclusion of all individuals – all talents necessary in science learning – students are asked to become societal Ambassadors by creating dissemination, by giving discursive argumentation with "peers" ("talking science") and participating to public events as active players (Fig. 3). Good examples of communication products and experiments developed by students (step 4 of the RM@Schools learning pathways – Fig. 2) can be found on the RM@Schools website under 'gallery' (Fig. 4)

*Fig. 4. Communication products of different typologies realised by pupils*
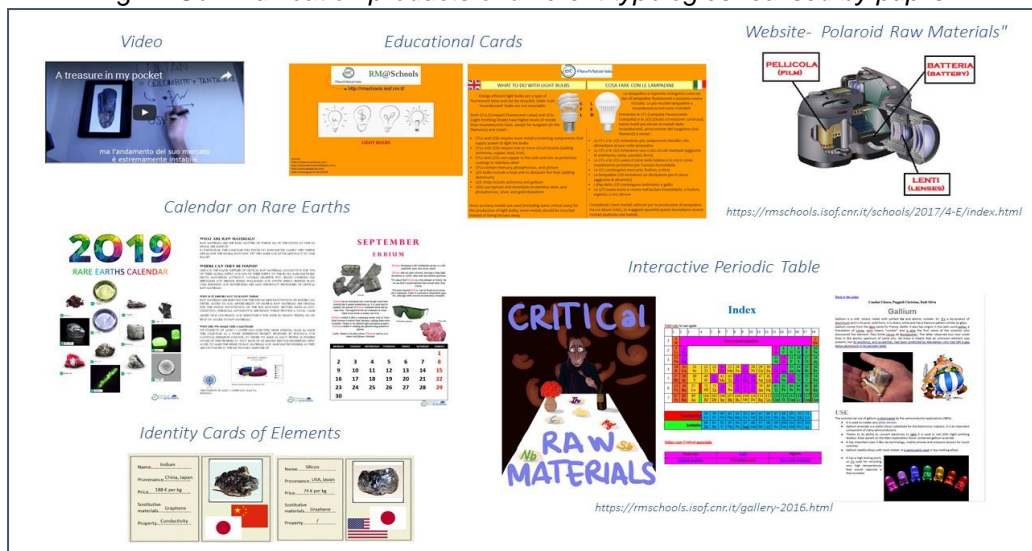


Project's European Conference that takes place annually in Bologna plays pivotal role in teaching science communication. It is not only a very important celebration of work done by students but it also gives young people the opportunity to meet their peers from the other countries and explain by themselves on the stage what they have created in the framework of the project.

## 5. Cross-curricular Links

Teachers can cover many topics within their curriculum using the concept of critical raw materials as a springboard. The RMs topic can be investigated from a science and technology perspective but can also be considered from a socio-political or economic viewpoint. It is a truly transversal topic and students can delve into the complexities of raw material use, through problem-based learning; addressing many societal aspects, and searching for solutions in a complex system. Raw materials are a great topic for students to investigate politics, policy, consumerism and the interaction between economics, politics and product use and development.

Subjects where RMs or critical RMs are relevant: Ecology/Environment; Biology; Chemistry; Geography; Physics; Technology; Social Sciences; Economics/Economy; Ethics/Philosophy/Religion; Media Studies; Politics.

## 6. Conclusions

Education and awareness of the RMs uses can lead to changes in governance as the values and voice of citizens are heard. By gaining a better understanding of these complex issues, we hope that students will become responsible and active citizens.

Thus, the RM@Schools methodology could be helpful in changing societal perceptions of RMs from "indifference" to "involvement and responsibility" as well as for ensuring a next generation of well educated, innovative and multidisciplinary experts so much needed in XXI century industry.

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# Special Needs

# Paving Educational Pathways towards Sanitation Awareness and Resilience in Afghanistan

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## Abstract

*In edition 9 of the International Conference of the Future of Education in Florence, Italy, ICUMEDA Intercultural Mediation & Art was introduced as tool for academic mediation facing special educational needs in the potentially traumatic context of war and flight. Raising awareness of relevant intercultural issues within the academic mediation framework (published under the term "Ur-Mediation" in the expert journal PERSPEKTIVE MEDIATION) has been this platform's priority: From 2015 to 2019, intercultural issues due to isolation and trauma were addressed and respective comprehensive programs were successfully accomplished in various academic settings in Afghanistan. As was already published in last year's Conference Proceedings, starting with 2020 ICUMEDA has started to lay its emphasis on mediating in intercultural and intergenerational topics related to tradition as is the case in the broad variety of sanitation issues. The new paper for this conference's 10th edition will give insight on compiled ideas and thinkable concepts that pave future pathways towards education in the field of sanitation awareness and resilience in Afghanistan – and the potential of new mediative art to enhance and beautify this participatory engagement.*

*Keywords: Academic Mediation, Trauma Pedagogy, new mediative art, upskilling pathways*

## 1. Paving Educational Pathways by Addressing Sanitation Issues

ICUMEDA Intercultural Mediation & Art was introduced as tool in setting the stage for upskilling pathways in Afghanistan hosting various contents [4]. Raising awareness of relevant intercultural issues within the academic mediation framework (published under the term "Ur-Mediation" [1]) has been this platform's priority: From 2015 to 2019, intercultural issues due to isolation and trauma were addressed and respective comprehensive programs were successfully accomplished in various academic settings in Afghanistan. Starting with 2020 ICUMEDA has started to lay its emphasis on mediating in intercultural and intergenerational topics related to tradition as is the case in the broad variety of sanitation issues [5]. The global outbreak of a pandemic which unexpectedly coincided with the advancement of this mediation concept gave even more impetus to realizing the importance of this matter.

As the ICUMEDA platform stems from the idea of mediation two significant aspects could be mentioned on how addressing sanitation issues is linked to interventions in the field of academic mediation. Some sanitation issues are historically linked to unsound tendencies of categorising individuals. Information boards inside the Toilet Museum in Delhi, India for example not only report on how the lack of sanitation in history was linked to war but also how the question of who is supposed to take care of the matter led to ideas that bore the potentiality of degrading individuals or whole groups of individuals.

Another aspect involves the sudden outbreak of a pandemic this year which

happened on a global scale, the whole world got almost simultaneously involved in one crucial matter that called for action. The self-conception of an intercultural mediator has to include ideas of paving educational pathways leading to the implementation of hygienic standards even where tradition and cultural taboo might be a roadblock on the way to it. Topics linked to cultural identity or water allocation in communities are about to gain new importance, and it is mentionable that the assignment of topics of these kind to the think tank of mediators has been an early piece of consideration also long before [8].

## 2. Paving Educational Pathways by Fostering Resilience

The process of fostering resilience has to be done in accordance with or with prior consideration of cultural conceptions in order to be of lasting value. As is the case in Afghanistan, poems often display cultural thinking patterns that can be used to build and strengthen the power of resilience. Here are two examples of Afghan poetry and how this can be a departure point for creating a resilient mental state:

A place where you have no acquaintance or friend; That city, the sea and the desert are all one and the same. [13]

The underlying thinking pattern in this beautiful poem here might be seen as loneliness being *always* a deplorable condition. The idea of fostering resilience for a traumatised individual that might misapply this poem comes into play when changing the deplorable condition of loneliness to a positive condition of solitude in which the increased amount of time is used to focus on creative thoughts. More ideas might include:

Learning to appreciate solitude and remoteness by not comparing the own situation to someone else's [6]. In some cases, moments of solitude spent in nature may serve as individual framework for calming down which is a first and important step in applied trauma(-informed) pedagogy [12]. Tranquil moments in nature may also be seen as opportunity to ponder over the inner sense of coherence, in the best case, or at least trying to deeply think about the personal room of activity which the current life situation provides, something that can be considered another initial step towards gaining resilience [10]. Appreciating moments of solitude and remoteness bears the potential for creative thinking, yet certainly the roadblock of uncreative and overbearing self-observation, hyper-reflection, should be reworked in trauma pedagogical interventions – assisting in "liberating the creative process from the inhibiting effects of any unnecessary reflection" [9].

If you fall from a mountain you can get up again. But the broken hearted will never rise again. [13]

The underlying thinking pattern in this beautiful poem might be seen as the experience of failure to be *always* indissoluble. The idea of fostering resilience for a traumatised individual that might misapply this poem comes into play when starting to view failure as life opportunity for improvement by simply taking a lesson from it. Finding beauty in learning from failure and the perception of something broken not to be consequently lost.

This process might be able to serve as participatory engagement, maybe even within the very creative realm of art. Introducing *new mediative art* did essentially mean introducing a way to turn experiences of emotional pain into creative art [3] aligned with the process of setting the stage for educational pathways [4]. Introducing *new mediative art* also included the fact that getting involved in it is the result of a solely voluntary incentive [2] as is generally the basic requirement for any action within mediation [7]. An artistic portray of images of both failure and unscathed glory, both imperfection and

superbness discovered as globetrotter on a world travel and exhibited in BEAUTFUL YOU ARE aims at perceiving ways to turn experiences of failure into potential beauty.

BEAUTIFUL YOU ARE is to be shown digitally for the second part of an Academic Symposium in Afghanistan this summer which is held as virtual event [5].

*New mediative art* is one way to make the participant see the *present* situation not as destination but as departure point, to learn to be generous towards the future by giving all to the *present*, and to assist in making the *present* a true gift and present [11]. It strives to further enhance and beautify this participatory engagement of paving future pathways towards education in the field of sanitation awareness and resilience in Afghanistan.

As complement and conclusion of this paper, another viewpoint concerning sanitation might be seen in the peculiarity of the situation which does bear the potential to be relieved in humour: Every human experience, no matter how significant or insignificant, can serve as basis for humour, if the truth and the pain that are found within become apparent for the audience [14]. Sanitation interestingly is commonly seen as either insignificant or significant issue, depending on the very individual viewpoint, and the fact that an intercultural mediator of academic performance is the one addressing and pursuing it may be the pretext to mutual humorous moments. Yet, this does by no means dampen the crucial importance of the sanitation issue especially in times of a global pandemic, in contrary, it enhances the actual beauty of accomplishing this potentially life-sustaining task.

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# Promoting Diversity:
# Heterogeneity-Sensitive Teaching of Scientific Writing

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## Abstract

*This paper presents a theory-led case study for a more diversity-oriented approach towards facilitating scientific writing skills in academia. Instead of promoting individual groups of students (segregation) or adapting students to the higher education system (integration) and thus excluding individual students, our goal is to establish a more inclusive approach towards academic student support.*

*Keywords: Scientific Writing; Diversity; Heterogeneity*

## 1. Introduction and State of the Art

For a growing number of prospective students, taking up a course of study is associated with many different barriers. Interdisciplinary competences are hardly addressed in primary and secondary education and are therefore differently developed at the initial study phase. Besides, the individual needs of students have increased [1].

In Germany, nationwide representative studies (DZHW, 2007-2018) on self-perceptions of first-year students show a trend towards a feeling of being overburdened with the multiple new requirements that are connected with admission to university.

Scientific writing in particular – which is a central requirement across all academic disciplines – presents students with challenges [2].

Currently, university entrants of all fields of study and types of college are widely (45.9%) confronted with difficulties when conducting basic disciplinary tasks like writing a term paper, a report or thesis [3] – over half of this sample (25.7%) even face "great difficulties". Manifold reasons account for this situation: For instance, non-native speakers especially with migration background or from first-time academic families are challenged by adopting peculiarities of their discipline's scientific language [2]. Moreover, the number of students with special needs is constitutive here: The results of the 21st Social Survey conducted by the German National Association for Student Affairs are representative for Germany, and they show that currently around 11% of students have a disability that makes studying difficult [4]. This represents a 4%-increase between their 2012 and 2016 surveys. Universities try to counteract by curricular measures (such as new methodological courses) or institutional support services. However, such services are predominantly used by traditional students. Although efforts to reduce barriers to education intensify in quantity, they usually do not take into account the specific support needs of an increasingly heterogeneous group of students: therefore, still only part of the students are reached.

One significant reason, we suspect, is related to the fact that when conceptualizing these support formats, it has hardly been considered, how different heterogeneity characteristics interact, such as biographical aspects (age, gender, etc.), socio-demographic aspects (life context, educational biography, etc.) or intramural aspects

(course of study, degree) [5]. Many writing projects and writing centers at universities and colleges will be closed at the end of this year (2020) as a result of an expiring nationwide funding program by federal and state governments "*Quality* of *Teaching Pact* (QPL)". This could lead to a further deterioration in the supervision of scientific writing in the future.

Against this background, this article examines the question of which criteria should be normatively taken as a basis for diversity-oriented guidance within the disciplines with a focus on scientific writing. First of all, the theoretical basis for this is to be created.

Using a case study, a possible solution is outlined in the form of a learning module that can be transferred to other institutional contexts.

## 2. Approach

Our approach follows the concept of student-centered teaching, in which all students can participate in the university community [3, p. 180]. At the same time, it is important especially for disadvantaged groups, to prevent an implicit 'compulsion for self-change' in higher education, which means that students are only successful if they can adapt themselves sufficiently to the 'university system' [7, p. 63]. Instead of promoting individual groups of students (segregation) or adapting students to the higher education system (integration) and thus excluding individual students, the goal of future concepts of higher education learning should be to strive for an inclusive higher education system [9, pp. 21-22]. This would go along with a new way of considering diversity, hence the 'shaping of a heterogeneously fair cooperation' through the careful and open handling of heterogeneity characteristics [8, p. 72].

## 3. Course of Action

Various measures are necessary to achieve a diversity-led attitude towards a more inclusive approach concerning academic student support. Opportunities have to be created for students to learn more from and with each other. Teachers have to take a back seat by acting as learning companions and mediators between learners, goals and content [8]. Thus, self-directed learning becomes the focus of teaching [6, p. 20].

Teachers can make use of sensitization tools such as the multi-level approach to diversity management [9, p. 23] in order to:

- encourage students as part of an *academic community*,
- interact in an *academic team* and
- appreciate *academic individuals*.

To promote diversity-sensitive teaching, different methods, tasks and media can be used. The Universal Design of Learning [10, p. 212f.], among others, provides various approaches to make teaching not only more accessible, but even barrier-free for some of our target groups. Blended-learning concepts offer a special potential for diversity-oriented curricula, especially in the context of academic writing [11].

## 4. Example of Implementation

How these measures can be implemented in practice will be explained in more detail below on the basis of interdisciplinary seminars for scientific writing.

### 4.1 Starting Point and General Conditions

In the following, a seminar concept will be presented, in which four to five times a year all-day meeting is organized by the student union (AStA) at the FernUniversität in Hagen, which is Germany's only state distance-learning university, and its largest in terms of student numbers. The seminars address students with special support needs and they are conducted by Louise Hoffmann. Each seminar is attended by 15 to 20 distance-learning students and lasts 3-4 days during the semester's marginal times. The participation costs are covered by the AStA and are subsidized by the Federal Ministry of Education and Research (BMBF).

Particular attention is paid to the individual needs of students. This is realised by means of a four-stage feedback system, which has been developed in the last years and consists of these four stages:

- Preliminary assessment of special needs when registering participants for the seminar.
- Anonymous formative evaluation during the seminar by depositing a feedback sheet in a bag that is regularly emptied in order to be able to make ad-hoc adjustments to the course interactions.
- Interim conclusion after each completed seminar unit through team discussion and individual reflection of the acquired knowledge on a team flipchart.
- Common evaluation sheet at the end of the course for the students' self-assessments with regard to learning success, competence development and potential for improvements.

The aim of the seminars is not only an introduction to scientific writing and, indirectly, to self-directed learning, but also the exchange of ideas and experiences among the participants and, in connection with this, learning from each other.

### 4.2 Procedures

At the beginning of the seminar, all participants receive a reader with materials from the speaker to continue the implementation of the seminar contents in self-study. Both the reader and the presentation materials are designed to be barrier-free, e.g. by using a strong contrast and a description of the images or graphics.

The course addresses the three diversity perspectives according to Auferkorte-Michaelis [9, p. 23]: the community, the team and the individual-distance learning students. It provides for a high proportion of discussions as well as team and individual work and few mediation components. Due to the different impairments and previous knowledge of scientific work, the exercises are planned in such a way that they can be completed by the expected target group either alone or with the support of a second person. In accordance with the Universal Design of Learning [10, p. 212f.], students are offered different approaches to the learning content, which they can absorb by hearing, seeing or touching. Results of a mixed-methods study between 2018 and 2019 show that the use of "LEGO® Serious Play" can be a great benefit in this context [12]. By making others "build" their writing assignment, students must be careful to describe their wishes as precisely as possible.

In addition to different sensory channels, an attempt is made not to perceive the respective impairment of a person as such, but to focus on individual strengths (cf. the concept of "multimodal promotion of writing skills" in [13]). Thus, the aim of the team and individual exercises is that all students actively participate and have a sense of achievement: Since the acquisition of scientific language is not a straightforward process even for native German speakers [14], the seminar is used to sensitize all participants

to the differences between scientific language and everyday language. The following exercise addresses this issue. It is based on the principle "Silent Mail": Person 1 formulates an everyday sentence at the top of a sheet of paper, which person 2 paraphrases in scientific style. Then person 2 folds the everyday sentence on the back of the paper so that it is no longer readable. Person 3 tries to "retranslate" this phrase into an everyday sentence, etc.

## 5. Critical Analysis

The various aspects of scientific work addressed in the course framework can be conveyed especially due to the heterogeneity of the students and on the basis of the selected exercises: Since physically-limited students interact with students without any particular restrictions in the "LEGO®-Exercise", mutually stimulating learning processes and a broadening of horizons are initiated. Besides, the educational interventions contribute to new perceptions and evaluations of the respective other. With regard to the exercise "Silent Mail", the evaluation of a survey showed that the discussion among the participants about their sentences often served as an eye-opener with regard to language barriers in scientific style. After the exercise students generally felt less deterred by the use of scientific style.

Due to the specific interactions we observed during the seminars, we assume that the learning setting described here has a stimulating effect on the development of relevant aspects of scientific competence as a whole. A high degree of diversity orientation also seems very conducive to critical meta-reflection and a controversial discussion of the learning content.

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# Students with a Migrant Background and Special Educational Needs: Discrimination and Specificities

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## Abstract

*In this work we discuss the Italian guidelines for Special Educational Needs (ministerial directive of 27 December 2012) taking into consideration their repercussions and implementations on the group of students with a migrant background. For the first time, through this directive, Italian education considers the linguistic and socio-cultural diversity as an educational disadvantage, to an equal extent to disadvantages such as disabilities and developmental disorders. In this work, after a short introduction on the Special Educational Needs typologies considered by the Italian guidelines, we will focus on the category of students with a migrant background. In details, we will highlight the relation between linguistic diversity, integration and discrimination, and the learning specificities of students with a migrant background. Students with a migrant background are a particular typology of students that can potentially have various peculiarities, and suffer from difficulties due to their life path. Learning repercussions are hence not limited to their linguistic and cultural knowledge, but could affect different learning aspects. Nevertheless, when talking about this group of students, the attention habitually falls on their linguistic skills in the language of instruction. In this regard, we emphasize that considering their linguistic diversity as a disadvantage could be discriminatory, especially considering that linguistic diversity should be instead thought of as an enriching factor.*

*Keywords: Special Educational Needs; Immigrants; Discrimination; Linguistic diversity*

## 1. Special Educational Needs and students with a migrant background

The assimilation of migrant students to the category of students with special educational needs takes place through the appearance of the Ministerial Directive of 27 December 2012. According to this directive, there are students who need special attention in every class and for a variety of reasons, such as social and cultural disadvantage, specific learning disorders and/or specific developmental disorders, as well as difficulties due to the lack of knowledge of the Italian language and culture [1].

More in details, the Directive considers three main groups of students needing of Special Education:

- Disabled students (according to the Law 104/92, a certification is required in order to be entitled to a support teacher);
- Students with specific developmental disorders (Specific Learning Disorders – for which the diagnosis is required, according to the art. 3, Law 170/2010 –, Language deficit, Non-verbal deficit, Motor deficit, Attention and hyperactivity deficit);

- Students with linguistic, cultural and social disadvantages.

This Directive introduces a substantial change regarding the definition of student with special educational needs, embracing students with learning difficulties due to socio-economic and linguistic-cultural disadvantages. The previous legislation on this matter concerned a more restricted category of students, namely the disabled students (law 104/92) and the students with specific learning disorders (Guidelines of the 12 July 2011).

Reflecting on the changes brought by the Directive of the 27 December 2012, it may be legitimate to ask whether the inclusion of the third category of students (the one with socio-economic, linguistic or cultural disadvantage) could act as a barrier to the homogenization of the class group, creating a further topicalization of the diversity, hence creating separation rather than inclusion.

## 2. Linguistic Diversity: Integration or Discrimination?

According to the Directive of 27 December 2012, students with a migrant background are considered in need of specific educational attention. Accordingly, linguistic and cultural diversity appears to be an obstacle to the student's learning of the school subjects. In this regard, it is appropriate to recall the importance of a multilingual society, which has been promoted over and over again by the European Union and the Council of Europe. Linguistic diversity should not be understood as an obstacle to learning, but as an added value, an enriching factor to be promoted within the European space [2].

The Council of Europe encourages language knowledge and learning. More specifically, it promotes early language learning (resolution of 16 December 1997), and the learning of at least two languages of the European Union, in addition to the mother tongue [3], [4]. The promotion of plurilingualism is justified by the fact that the ability to speak multiple languages promotes communication – and, therefore, collaboration – between countries [5]. Furthermore, it facilitates the movement of people, inter-understanding and intercultural relations [6], [7].

Therefore, the linguistic diversity of the student cannot and must not be labelled as a "disadvantage", as this would generate a situation of inferiority for the student towards the other members of the class.

In this regard, it should be remembered that the Charter of Fundamental Rights of the European Union prescribes the equality of all people (art. 20), prohibiting any form of discrimination (art. 21) by race, colour, ethnic origin, and social, genetic characteristics, language, religion, etc. [8]. In this respect, it is necessary to question the effects of the recognition of migrants as students with special educational needs.

Through this Directive, is their integration promoted or are they actually discriminated against?

To come, or to have origins, from another country, means bringing a cultural and linguistic baggage that adds up to the one that is acquired (or acquirable) in the country of residence. The "different" language and culture are, in this sense, an opportunity, and an enriching factor for the student. It is therefore necessary to consider that what it is thought as a disadvantage is actually an advantage. In this regard, it is necessary to remember that the mother tongue is an important vector in learning a second language, therefore it is necessary to be very careful in considering it an obstacle, or a disadvantage. At this respect, there are numerous works that testify the importance of the mother tongue in learning a second language, both for reasons related to the student's psychosocial well-being, and for reasons strictly related to language learning [9], [10], [11], [12], [13], [14], [15], [16].

## 3. Critical Issues on the Learning of Students with a Migrant Background

When considering students with a migrant background, it is necessary to shed some light on the aspects that can influence their learning processes. Although educational attention towards these students are mainly limited to communication difficulties in the dominant language, there are other factors to take into consideration.

Living in an increasingly multicultural country, teachers need to have at least basic knowledge about the geographical and cultural origin of their students. In addition, if we think about the specific category of refugee students, the attention necessarily turns towards their particular migration path, as well as the reasons of the migration, which can have repercussions on learning [17].

Regarding the influence of migration (i.e., students from war countries), it should be noted that this type of students often interrupts their studies or lose entire school periods (even years). The repercussions that these events have on their education include difficulties in adapting to the new school system and school materials [18], [19].

Repercussions can be evident, as this type of situation can generate absenteeism and school dropout [20]. Furthermore, students who suffered traumas (having experienced or witnessed violence) and war can develop mental disorders. The most common is certainly post-traumatic stress disorder, but they could also have behavioural disorders, depression, anxiety, etc. These conditions can negatively influence learning, resulting in low school performance, absenteeism, school suspension, low IQ, reading deficit and low marks [21], [22], [23], [24]. A last remark must be made about migrant students with disabilities. In fact, the co-presence of these two factors can have an outcome in the school integration, due to the discrimination that they can cause.

## 4. Conclusion

Students with a migrant background are a particular type of students who can have different difficulties and specificities based on their life path. Repercussions on the learning are various and not limited just to linguistic and cultural difficulties. Nonetheless, when discussing this group of students, the attention often falls on those. Such presumed "difficulties" are also taken into consideration by the Directive on Special Educational Needs, in the section that addresses students with linguistic, cultural and social disadvantages. In this last regard, the Directive seems to excessively circumscribe the needs of these students, not taking into account their peculiarities and perpetuating the idea that the main difficulty of these students is linguistic integration. In this regard, it should be noted that, by carrying a "different" cultural and linguistic background, these students have a cultural advantage rather than a disadvantage. This diversity is also considered by the European Council as an element to protect from any type of discrimination. For this reason, finally, we highlight whether considering one's linguistic-cultural background as a disadvantage is, in reality, a form of discrimination.

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# Students' Assessment

# St. John's University's New York State Registered Master of Science Degree in Cyber and Information Security

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## Abstract

*The field of cybersecurity is expanding at an unprecedented rate. The rapid development is due in part to the ever-increasing city, state, federal, and international regulations for the privacy and security of sensitive communications and the underlying data. This paper discusses the research and statistics involved in developing a New York State registered Master of Science degree in Cyber and Information Security at St. John's University. The program is a 30-credit master's program that combines cybersecurity and information science. It is designed with cybersecurity specialists, IT enterprise professionals, and data scientists in mind. The knowledge it provides can also serve the cybersecurity skill needs of the wider community of IT managers and computer professionals. Our research paper explores the courses chosen in the current program to keep-up with the pervasive nature of cyber threats. We discuss the appeal of the program to students who want to become cybersecurity specialists, change their careers, or improve their skills. Finally, we share the lessons learned creating the program.*

*Keywords: Cyber Security, Cybersecurity, Information Security, Digital Forensics, Graduate Program, Master of Science, New York State, Online Distance Learning.*

## 1. Introduction

The need for information security and cybersecurity has been increasing at an unprecedented rate. The rapid changes are partially due to three main factors. First, there is an ever-increasing number of new information systems being developed and deployed. Second, the regulatory and risk factors are being regularly redefined, improved, and developed. Third, incidents and breaches are occurring at an alarming rate.

Just several years ago there were few graduate degree granting institutions in the U.S. for cyber or information security. At the time of our application, there were only four similar programs in the entire New York City area.

St. John's University is a Catholic four-year private institution with its main campus in Queens NY. Its undergraduate program in cyber security systems and graduate program in cyber and information security are given through the Collins College of Professional Studies. The graduate program in cybersecurity will be offered in both traditional (face-to-face) and online distance learning formats. Our university is accredited by Middle States and the undergraduate cybersecurity program is currently going through ABET accreditation.

## 2. Review of Literature

The trend for using technology to make life more convenient is growing at a rapid rate due to the rise of the Internet of Things (IoT). Chandrashekhar *et al*. [11], reported in 2016 that it is estimated 75 billion devices will be connected in 2020. More and more people are getting and staying connected. The millennials are creating and using IoT devices daily, with generation Z not far behind. The developers need to secure these devices and keep consumers' data protected. With so much connectivity, there is a growing interest in the area of cybersecurity and a growing demand for graduates who have the skills necessary to keep products, consumers and corporations safe and secure [11].

The cyber and information security curriculum has increasingly grown. What was once part of a program in computer science with a few courses, special track or option is now a full program of study at the undergraduate level which also has introductory fundamentals even in high school and more specialized programs at the graduate level of study with research [12].

The U.S. federal government, recognizing the growing importance of cybersecurity, has invested resources into education and specialized programs including the National Initiative for Cybersecurity Education (NICE) and the Department of Homeland Security (DHS) Cyber Skills Task Force [13].

Andel and McDonald [5] discuss formalized four-year academic programs supporting cyber and information assurance requirements. Their work documents curriculum development that focuses on a systems level approach to cyber assurance education.

Chow, Crutchlow, and Cain [6] hosted a practitioner panel to provide perspectives on the cybersecurity workforce shortage based on personal experience, and share ways that the academic community can improve the pipeline of cybersecurity graduates with needed skills.

Goel and Kumar [2] presented a poster describing concepts around developing skills via a more complete cybersecurity ecosystem involving collaboration and synergy among the four main pillars of society: Academia, Government, Industry and Social Civil Societies.

Yamin and Katt [3] mapped job skills to their academic programs and evaluated map against two certification programs: (1) CREST registered penetration tester for red teams and (2) Securing web applications, Services and Servers for blue teams, which are not under US-DOD 8570 baseline, but are approved by UK GCHQ. They then identified that their map covered the basic security skills present in those certification programs.

## 3. Core MS Curriculum

The cybersecurity knowledge-base for the workforce varies by role. In depth skills, training in software tools, and ethics must be built into any effective graduate program to ensure student success and job placement.

The St. John's graduate program was designed to give students all the necessary skills in core foundation courses as well as specific disciplined courses in more focus-based areas of information technology, data science or cyber security [4]. Students enrolled in the cyber and information security graduate program will complete a master's thesis or capstone project.

They'll work closely with faculty having specialized skills in cyber security, digital forensics, computer science, data science, artificial intelligence and machine learning.

The dual teaching formats (traditional and online) make the program attractive to a variety of local, out of state, or international students. It's designed for students who have

undergraduate degrees in computer science, IT, or are looking for a change in career (www.stjohns.edu).

## 4. Program Design to Meet Professional Needs

There will be 3.5 million unfilled cybersecurity jobs by 2021, while cybercrime costs are expected to hit six-trillion dollars annually. From 2017 to 2021 cyber spending will exceed one-trillion dollars [8]. Hanover rates computer and information systems security/information assurance as one of the highest growth fields within Computer and Information Technology Administration and Management [9]. This booming need inspired the 30-credit program. Students will all take core competency courses in foundations in cybersecurity, protection of digital infrastructure, cybersecurity laws regulations and best practices, and principles of secure scripting and cryptography.

Given the needs for today's jobs and the skills necessary to get employed and do well within the job, they may optionally complete a specialization in data science or IT enterprise [1].

## 5. Lessons Learned and Future Research

There were many lessons learned during the creation of our program. These lessons along with experience gained from running the program will lead to different strands of future research.

### 5.1 Lessons Learned

We have learned many lessons in the development and accreditation of a new master's program. First, in order to create a new program, there is a process that our faculty must follow which includes creating an initial proposal that is supported by both our dean and the deans of the other colleges within the university. Once approved, the proposal is completed by division faculty and approved internally. The proposal is reviewed by the college Curriculum and Education Committee before going to the college Faculty Council. Its next steps are the university Graduate Council and Board of Trustees. Once completely approved at the university level, the application is then sent to the NY State Department of Education for final review and approval. Only then will the application be registered as an official degree program. This process took over two and a half years. Experience creating similar graduate programs in Data Science and Computer Science helped tremendously.

Second, marketing is essential for a new program. It is very important to identify websites listing relevant programs and get the new program included. Reaching current undergraduate students at the university can fast track applicants to the program.

Undergraduate alumni from the cyber security systems, computer science, information technology, networking, and healthcare informatics have been informed of the new opportunity that the school has to offer. It's also important to host information sessions for interested students.

Additionally, the chair and program directors reach out to members of the advisory board and local professional organizations to promote the major and to gather input for continuously improving the program. Utilizing these resources helps to strengthen the program and provides the networking ties that our students and faculty can use to promote internships and possible job placement.

### 5.2 Future Research

There are many pathways for future research for our masters of science program.

First, we can further expand and improve on the overall curriculum. Second, we can explore capstone and theses which have been studied in the program. For example, Freeman, Haigler, Schmeelk, Ellrodt and Fields [7] explored doctoral dissertations through the lens of machine learning. A similar study could transpire for our program.

Third, we can explore research projects within the program. Fourth, we could explore further accreditation and industry job mappings for the program. Fifth we can also conduct research with faculty and students in the division's other graduate programs of study in computer science and data science and can collaborate on Artificial Intelligence, Healthcare Informatics and other topics where cybersecurity is essential and gaining interest.

## 6. Conclusions

Developing a New York State cybersecurity program has been a significant undertaking but extremely rewarding. This program fills a program gap in the New York, Long Island, and Metropolitan area for students interested in cybersecurity especially for those interested in specializing in digital forensics, data science, information technology enterprise and who may be looking for a change of career.

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# Studies on Education

# Can Moral Psychology Inform Moral Education?
# Some Critical Perspectives

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## Abstract

*As teachers we frequently face situations where we are expected to make moral judgements and act upon them as a part of our pedagogical practices. This is one reason why practitioners and researchers tend to agree on that teaching is an essentially moral practice. However, according to recent development within moral psychology, we often make judgements based on emotionally driven intuitions and afterwards make up reasons to explain them. This provides a challenge for the traditional views of moral education. Thus, the overall aim of this paper is to present and critically discuss what the new findings of moral psychology can contribute to moral education. Initially we will present the theory and argue why it seems to provide an important contribution to our understanding of the normative dimension of education. Finally, however, we will use philosophical method in order to critically examine of some of the core features of the model and discuss which consequences it has to, for instance, aspects of care which is inherent in an educational context.*

*Keywords: Moral education, Moral psychology, Care ethics*

## 1. Introduction

As teachers we frequently face situations where we are expected to make moral judgements and act upon them as a part of our pedagogical practices. This is one reason why practitioners and researchers tend to agree on that teaching is an essentially moral practice [1], [2]. However, they often seem to disagree on how teachers *ought* to treat ideals, norms and values in their pedagogical practices. Hence, a division is regularly made between *character-based* and *reason-based approaches* to moral education [3] [4], [5]. Some researchers have argued that teachers should lead by example and thereby help their pupils to form good habits and develop desirable character traits such as integrity and tolerance. This is often combined with an emphasis on the ability to respond emotionally to others as a part of a social group which is characteristic of a character-based approach [5], [6]. Other researchers have argued that teachers should challenge their pupils with moral dilemmas and thereby contribute to their ability to reason and develop cognitively. This is often combined with an emphasis on the ability to think rationally as individuals which is characteristic of a reason-based approach [3].

According to the recent development within moral psychology, however, we often make judgements based on emotionally driven intuitions and afterwards make up reasons to explain them. In other words, moral judgements involve both emotional responses and rational thinking, where the importance of the latter often has been overestimated [7], [8]. Thus, the overall aim of this paper is to present and critically discuss what the theory can contribute to moral education. Initially we will present the

theory and argue why it seems to provide an important contribution to our understanding of the normative dimension of education. Finally, however, we will use philosophical method in order to critically examine of some of the core features of the model and discuss which consequences it has to, for instance, aspects of care, which is inherent in an educational context. This is, of course, a challenge for the traditional views of moral education.

## 2. Moral Psychology

Jonathan Haidt has conducted studies where respondents are given an opportunity to review a number of stories, that do not involve any harmful intentions or consequences, but violates different cultural taboos. The stories involve, for instance, someone who has the family's departed dog for dinner or become involved in an intimate relationship with a sibling. A conclusion of the studies is that the majority of our moral judgements are made automatically based of how we react emotionally in different situations. In retrospect (*post hoc*) we try to find rational justifications for the judgements, for instance, with reference to that someone could come to harm. The reasons are often given without regard to anything that speaks against the immediate reaction and are intended to justify our judgement to others in a social context. Because of our sensitivity to group norms the judgements tend to affect people in our social setting regardless of the strength of the arguments put forward [9].

Thus, Haidt presents a model where moral judgements involve two cognitive processes, emotional responses and rational thinking, where the significance of the latter traditionally has been overemphasized (cf. [7]; [10]). The awareness of that emotional judgements precedes their rational justification is important for teachers in order to be able to contribute to improve the quality of their pupils' moral judgements and behaviour.

It is, for instance, possible to develop a more nuanced thinking by engaging in discussion with others. Even if each of the participants in a discussion would be inclined to seek confirmation for their beliefs, they would be challenged by others, making the outcome of such a procedure easier to justify [10].
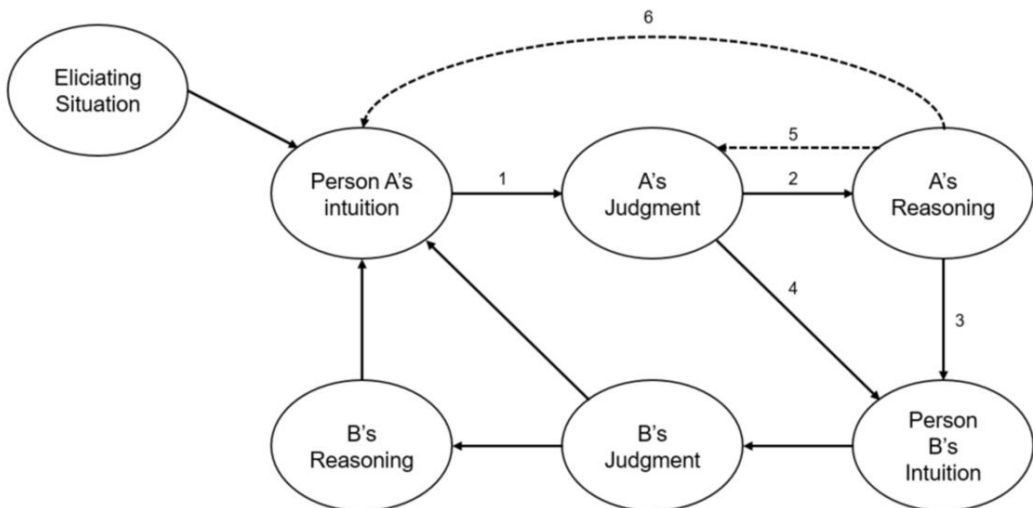


Figure 1: Haidt's social intuitionist model of moral judgment, (1) the intuitive link, (2) the post hoc reasoning link, (3) the reasoned persuasion link, and (4) the social persuasion link. Following links occur less frequently: (5) the reasoned judgment link and (6) the private reflection link [7].

The reason why people react intuitively is, according to Haidt, that we have an innate preparedness for things that can appear threatening in social life (cf. [9]; [10]). The moral consciousness is compared to a tongue, with different types of taste buds, which together can cause a variety of sensations. Haidt has described these receptors as pairs, for example: care/harm, justice/cheating, loyalty/betrayal, authority/subversion, holiness/degradation, liberty/oppression [10]. Which of these the individual develops a taste for depend, to a large extent, on the social and cultural context.

The background to the disagreement between proponents of character-based and reason-based moral education is, from this perspective, that they emphasize different parts of our ethical thinking. The character-based model stress the ability to feel empathy, solidarity and group affiliation, while the reason-based model stress the ability to think rationally, consider consequences and universalize judgments (cf. [4]; [10]).

Haidt and his collaborators have suggested that the debate between different moral pedagogical perspectives should be integrated as a part of how norms, ideals and values are dealt with in education [4]. In this way, Haidt's solution to the conflict between character-based and reason-based perspectives on moral education, is to raise the level of abstraction.

A reason why these psychological studies are relevant for moral education is because if people, for example, were found to be psychologically incapable of acting in accordance with virtues or normative principles, they would risk losing their significance altogether. This would, of course, call for considerable changes in the way the subject is taught. Yet, the model has, with few exceptions [cf. 12-14], not been subject to much discussion within the educational field.

## 3. Informing Moral Education

In this section, we will critically examine Haidt and his collaborators' proposal of moral education, and provide a contribution to the discussion. As we have seen, Haidt is arguing that emotions have crucial significance for moral judgments, and criticize traditional moral psychologists for overemphasizing reason [7], [9].

Haidt and his collaborators propose that their psychological findings have broad implications on the subject of moral education [4]. They attempt to solve the ideological dispute between character-based and reasoning-based approaches by raising the level of abstraction. The proposal amount to a meta-perspective on moral education in which teachers should make use of the ideological division, engaging children in debating which virtues to promote and confront moral disagreements [4]. Haidt's contribution within moral psychology, we argue is somewhat contradictory to the proposed raise of abstraction within moral education. Considering that the psychological findings stresses the importance of emotion and social context, it is unfortunate to disregard this in relation to moral education. For this reason, a relational approach to moral education we believe is a promising perspective in order to utilize Haidt's psychological findings within the educational field.

The relational approach, often referred to as ethics of care puts great emphasis on emotion as fundamental to moral development [15]. This prominence to emotions, along with the understanding of care as an inherent foundation makes the approach compatible with Haidt's social intuitionist perspective (Fig. 2). However, care is not to be considered a trait in line with the tradition of character education. It is rather from both a descriptive and normative perspective, a recognition of situated social relations as basis to human moral. According to care-ethicist Nel Noddings, care is regarded as either natural or ethical. The fist is an innate disposition and revolves from an unforced will to care; the latter is instead based upon ethical considerations proceeded from previous experiences

[15]. The aspect of care, we argue is inherent in an educational context since school is to be considered a living social community. Due to the understanding of care as situated and contextual, a higher level of abstraction and rational treatment of moral questions would be a contra productive method to achieve moral development. By implementing such a practice, the importance of emotional response in social relations, which is to be considered an essential part of education may be seriously underestimated. Although we are critical to the methodological proposal of raising the level of abstraction, the findings within moral psychology conducted by Haidt have great potential to inform moral education. Within moral psychology, Haidt's theories disputes traditional understanding of moral judgment and unilateral focus on rationalism and moral reasoning. Hence, this displacement ought to be conceivable within moral education, recognizing the importance of emotion, relation and context in educational practice (see Fig. 3).

Investigation of the psychological predispositions in caring relations could further result in a moral education with a collective and structural focus. This would be fruitful since it enables for interventions on various levels, between individuals, within and between groups, and perhaps most important on the level of school organisation.

## 4. Concluding Remarks

In relation to moral education, there is reason to remain somewhat sceptical to Haidt and his collaborators' proposal. A meta-perspective on moral education we argue, is contradictory to Haidts influential findings within moral psychology. Since Haidt emphasize the importance of situated relations and emotional effect on moral judgment, it would be beneficial to incorporate this as a vivid part of moral education. We believe this could be achieved through the relational approach of care ethics.

## 5. Illustrations
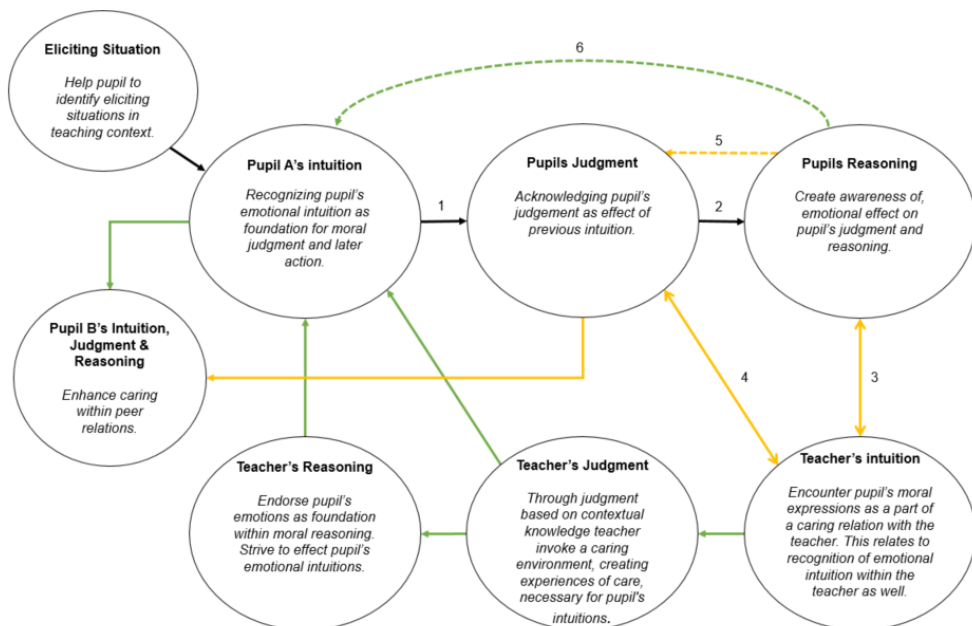


Figure 2: An example of teacher promoting caring informed by social intuitionist model (SIM) within an educational context. Natural care enhanced by green links; Ethical care enhanced by yellow links.
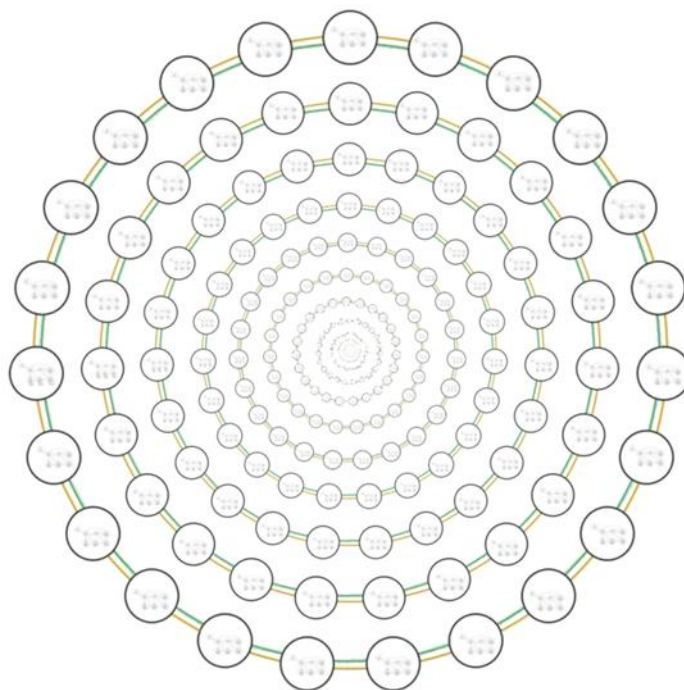
Figure 3: Creating a context of caring by promoting natural and ethical care informed by the social intuitionist model. Yellow links represent natural care through interventions directed towards intuition. Green links represent ethical caring increased by intervention directed at reasoning and judgment.

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# Constructivist Learning Conversations in Writing Centers: Feedback and Reflection as Integrated Tools

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## Abstract

*Learning how to write, from the constructivist perspective [1], is seen as a mental process; therefore, is best achieved when students face complex, real-world issues in which the steps are graded and the answers are unknown. The fact is that the writing process can only be well-guided by the teachers whose roles can be a facilitator, a guide, and a reflective practitioner [2]. Writing centers, employing different learning needs, are coming of age because of their attractive learning environment and timings, for students to share their concerns one-on-one, to explore meaningful conversations, and to freely engage in a guided process. The environment for experiential learning [3] how to think and to write is based on a one-on-one or group work instruction after becoming apparent that writing could not be taught to a classroom of a large number of students effectively. An essential part of the student learning process at writing centers comes from engaging with feedback and reflecting on students' written papers as integrated tools used synchronously leading to student engagement in reflection and engagement with the feedback methodology. This study mainly deals with the mentioned feedback students get orally at centers, and the accompanying tools-reflection and the reflective practices experienced by students during their writing journey. While explaining the journey, the focus primarily will be on qualitative study outcomes, self-initiated practices reported, reviews of field studies and drawing connections on the previous studies and analysis. Reflection on the main research question, the following points will guide the formation of the theoretical framework for this study: a) what sort of methodology the centers can employ and what type of methodological tools can be used for the students coming from mixed abilities with different needs b) which theoretical foundations for a principled approach/method to teaching writing can be employed by the centers c) what teaching techniques and activities work best under the selected approach/es d) can we use oral feedback and reflection as integrated tools in the center as a methodology e) how can we make students and consultants reflective in this guided process?*

*Keywords: Writing centers/Labs, constructivism, feedback, reflective practice, andragogy, experiential learning*

## 1. Introduction

The centers, although it is impossible to make generalizations and specifications for all, can be considered as academic facilities where students see the "knowers" as knowledge-feedback providers and where they can meet with the provider face-to face or online (one-on-one or in groups) to improve their writing skills. Both consultants and students, in order to promote dialogue and negotiation, methodologically, accept mutual agreement in a non-threatening environment where receiving/sending knowledge with questioning techniques in that learning process is the ultimate goal.

This study addresses a few educational issues-a comprehensive methodology in writing and its accompanying teaching tools-by proposing a means of using oral feedback and reflection as teaching and learning tools for furthering and supporting student reflection in writing skill at centers. The broadest question of this paper is to discuss what sort of methodology the centers can employ, and what type of methodological tools can be used for the students coming from mixed abilities with different writing needs. That the types of strategies provided make the learners and the consultants reflective? Pursuing the above questions involves the following four research domains: academic writing, constructivist theory of learning based on Kolb's experiential learning model and Knowle's Andragogy of learning, Schon's reflective teaching and reflection and oral feedback. To be able to answer the research questions above, we should first set the theoretical principles of the stated domains, and explain the epistemological and methodological framework within the principle/s of constructivist theory.

### 1.1 Constructivist Learning

After 1930's and 1940's, under a pompous effect of Behaviourist theory in writing and education, witnessing the harmful effects of the Pavlov-like-minded educators in the field, most of the students witnessed the negative emotional climate of writing process.

Shifting this paradigm from Behaviourism to Constructivism, the focus has become more on how information processes in the minds of the learners, in which steps have been taken in the learner's mind while learning, and the changes in perceiving writing as social and meaningful act. "Alternative approaches and methods" of the 1970s and 1980s [4], provided evidences of somewhat the varied history.

Writing as a productive skill has shifted its paradigm from product oriented to process oriented view, which is consistent with the shift from traditional teaching to alternative approaches [4], focusing on the learners and their involvement in writing skill courses [5]. The succession of a writing event in the course of time give learners the possibility of revising/revisiting their thinking. So, the learners through anticipating the writing event elaborates their experience, actively encounters the experience, and then assesses whether the outcome has been validated and the process has been fulfilled. Kelly proposed steps of change and the discussed belief system of the learners though the corollaries and his main postulate [1]. This view, as justified by [6], explains the concept of "assimilation of knowledge into person's action schema" by connecting action with the happening based on his fundamental fact of knowledge.

Regarding the relationship between theory of Kelly's Constructivism and writing skill, this study adopts Kelly's famous claim seeing person-as-the-scientists [7] and their development from the view of Piaget's theory proposing "to understand is to discover, or reconstruct by rediscovery…" (as cited in [8]). Under the light of constructivism and Kolb's experiential learning cycle, this study addresses how oral feedback and reflection can be used as integrated tools in the consultation process of writing centers. Learners in that specific context will be discussed under the five assumptions of Knowles's "Androgogy" [9], describing adult learning as "the art and science of helping adults learn", to some extend with his practical description of androgogy. He sets the assumptions about how adults learn, as: Self-Concept, Adult Learner Experience, Readiness to Learn, Orientation to Learning, and Motivation to Learn [9].

### 1.2 Feedback and Reflection

Writing skill competency includes "reflection as a core element in addition to knowledge, skills and attitudes, values and communication" [10]. Feedback is generally "associated with interaction between two persons" whereas reflection is considered as a

"process in which the individual teacher or student, soon after an episode, thinks loud about (or rather meditates upon) what exactly happened, why did it happen that way, and what could have been done better". [11] considers "feedback as 'information provided by an agent…regarding aspects of one's performance or understanding,' highlighting that feedback legitimately comes from non-teacher sources". They also state that "When examining research about feedback, opinion varies about *who* should provide feedback, *how and when* it is best delivered, *what* the content of feedback should be, and *why* it should be provided". Feedback, unlike in the traditional classrooms, comes with its non-judgmental nature, and is evaluative, guided, timely, and focused. [12] depict "Feedback is an instructional practice indicated as enhancing both students' skills and motivation…. an agent regarding some aspect(s) of the learner's task performance, intended to modify the learner's cognition, motivation and/or behaviour".

Reflection "is the ability to reflect on and analyse material in order to form reasoned judgements" is seen as "central to critical thinking and deeper learning" [13], [14] consider reflection as a mental process incorporating critical thought about an experience whereas [15] takes it as reflective learning process. Donald Schon is regarded as having a major contribution to the understanding of professional practice and reflective thinking [16]. Dewey is considered notably; as he mentioned, ideas are simply imposed on students remain 'static' and 'hamper' or 'swamp' thinking (Dewey cited in [16]).

Schon proposes practical knowledge that all professionals hold about their profession, and suggests that practical knowledge is developed within action, "just as it is articulated within action. The concept "reflection-in-action" is invoked to refer to the active and non-propositional processes by which new knowing-inaction is developed-a matter" [17]. So, one can experience reflection-in-action while reflecting-on-action. Schon, combining the feedback and reflection, states that "Actions proceed, with relative success, because we are attentive to feedback; and, generally, the feedback is unsurprising".

"Feedback on written work can be used as a vehicle for reflection" [13]. Both feedback and reflection require practice, action; feedback can provide students with a concept of experiential learning in the learning environment, and that will lead to effective reflection "providing an opportunity for feeding forward and for self-development for university students, and placing reflection on feedback at the heart" Mutch in [13]. The belief system of the teachers certainly affects the way of judgements and the role of them in the process [18]; and "such beliefs are partly the result of personal constructs but also originate in the social context in which teachers work" [19].

Well-monitored and thoroughly managed feedback – if accurate, timely, comprehensive, constructive, supervisory, and appropriate – has great potential to feed the learning process further, encouraging, and also motivating for the future tasks.

Reflection enables students to re-examine their task-based learning experiences, and motivates to finalize documents based on given feedback, which facilitates and further enhances through the implementation of the reflective practices.

### 1.3 Writing Centers/Labs

The centers, as an enabling academic facility, guide students based on their individual writing needs and interests across the curriculum. The goal is to equip students from all disciplines and levels with the necessary skills required in their personal and professional academic lives, employing a teaching methodology, which is purely constructivist, student-centered, and accepting inquiry-based learning in which questioning-based interaction techniques are employed.

"With the supportive, collaborative pedagogical strategies of one-on-one conference

in which the student sets the agenda for learning" [20], the labs provide a broad range of services, including on-site and on-line consultations and various outreach programs.

To that end, although a great deal has been discussed about them, there are still debatable methodological issues utilized by the centers, which fosters the need of improvement through critical analysis of the methodologies used.

### 1.4 Consultation Process and the Procedures

Consultation process at writing centers are expected to start with a clear understanding and the expectations of the assignment/s; clarifications are made orally, the scope of the work, aim of the session are discussed, and only then ultimate goal is set for the session. The feedback and reflection strategies are used in combination orally and professionally. In order to establish an effective feedback-reflection process, feedback whether written or oral should be designed, providing opportunities for feeding forward and self-development of students [13]. "When feedback is given with the aim to enhance writing performance, the assumption is that it evokes reflection on the content and the process of writing. Mindful reception of the feedback promotes learning or performance" [21], [12].

### 1.5 The Role of the Consultant

This may be the most unique side of the centers where all parties are collaborating, work as equals, where the consultants facilitate learners in the process respectfully.

Consultants facilitate learning through the Socratic method (posing open-ended questions or leading questions pertaining to student writing). The non-directive strategies provide student a kind of guidance, minimize the superior role of the consultant, create a respect for the consultant's ownership. Building a confidence with the learner, the sequence of the conversation process always begins with encouraging the students to clarify their needs and questions during the session. Consultants literally act as organizers of resources and resource themselves.

### 1.6 Learning Environment

Unlike the traditional classroom settings and environment, writing centers deal with the process of writing rather than merely focusing on the end-product. Due to the welcoming nature of the environment and formal assessment of the end-product, the learning process minimizes the risks, fears, shyness, etc., … but more motivates and encourages students to keep forward in a mutual discussion and in a relaxing environment with non-directive strategies, which allow learners more space for finding alternative ways, solutions, revisiting the previous alternatives and ensuring the best higher order thinking skills in a Socratic way of questioning manner.

### 1.7 Teaching and Learning Strategies and Tools

The writing centers provide a setting where both parties join in the learning process together, where the consultants share their experiences and knowledge, and the learner receives feedback other from the consultant, other than the classroom teacher or friends.

The open channel of communication is provided as to see the natural ongoing learning process engaging the learner in the process by reducing the learning anxiety, breaking the barrier of learning such as weaknesses, unclear points, etc., … where both parties experience a unique relationship together.

## 2. Methodology

This qualitative study approaches to writing issues from methodological perspective, which aims to contribute knowledge and understanding by describing the methodological tools and strategies used at writing labs. As such, the purpose of this qualitative research is not to provide generalizable findings. Instead, this research has a discovery focus and uses an iterative approach.

Although many Writing centers are not experiencing diverse student population, there is an increase in diversity affects – the way that the centers function comprehensively at all levels, from Capstone projects, seminars, workshops to one-on-one and/or group consultation sessions with the registered students who schedule appointments for their writing concerns. This paper closely takes a look at the teaching tools and strategies used by the consultants at the centers-where all students are expected to take semester based academic courses and deliver papers. Reflection on the above issue, the following research questions guided the formation of the theoretical framework for this study:

### 2.1 Which Theoretical Foundations for a Principled Approach/Method to Teaching Writing Can Be Employed by the Centers?

The review of literature and the qualitative study outcomes [22], [23], [20], [24], [25], [26], [27] prove that the process of learning at centers require consultation related concepts and theories. "More recently, the writing process has been framed within a social constructivist philosophy". So, ultimately, we refer to Constructivist Learning principles and Communicative Task based teaching efforts. The environment for experiential learning [3], the constructivist learning principles are applied in sessions, which is guided mainly by four principles-holistically learners construct their own meaning making process through active experimentation; new learning builds on prior knowledge; learning is enhanced by interaction; and learning develops through authentic tasks [7].

### 2.2 What Teaching Techniques and Activities Work Best Under the Selected Approach/es?

Teaching techniques and activity types at centers varied, such as dialogue, responding to command, group work problem solving/task completion, information clarification activities, improvisations, question and answer, or simple corrections through guided and facilitated conversations. [28] describe the learner's role within CLT in the following terms: "The role of learner as negotiator – between the self, the learning process, and the object of learning – emerges from and interacts with the role of joint negotiator within the group and within the classroom procedures and activities which the group undertakes" and "The implication for the learner is that he should contribute as much as he gains, and thereby learn in an interdependent way". According to [29], the more basic the idea the student has learned, the greater the ability to apply it to new problems.

### 2.3 Can We Use Oral Feedback and Reflection as Integrated Tools in the Center as a Methodology?

These strong tools confirm that integrated use of both of them can reinforce students' behaviours, activate their use of knowledge process, correct their behaviours, and promote improvement in their performances that could lead to change. When properly received, feedback can help lab students "develop metacognitive perspectives needed to improve their performance and monitor their own continuing progress" [20]. [12] addressed the effects of feedback providing improvement strategies and of a reflection

assignment on students' writing performance, writing motivation, and writing process; the study showed that "significant interaction effect of feedback condition and reflection condition was found for performance". Feedback was used in various educational settings and was regarded inevitable to improve knowledge and skill acquisition [30].

Reflective practice, on the other hand, is not a continuous process; while reflecting in learning as a response to question related to task or unexpected moments, the response of a student triggers questions about tacit practices and their underlying assumptions, [31]. Reflective thinking [2] are the valuable strategies not only for the students who get the support to develop ability and skills but also for the instructors who could use to refine and improve the teaching, which may lead to growth in professional practice.

## Conclusion

The qualitative studies comprehensively provided a conceptual analysis of "feedback and reflections" of the instructors as evidence related to their impacts on learning and achievement in classroom settings and the writing center. "Feedback and reflection are a particularly important focus […] because the effective and regular reflection on feedback remains a fundamental mechanism for … university students feel supported, accustomed to and comfortable within the university environment" [32]. Constructivist approach and the suggested tools at personal development level provide learners with the opportunity to construct their own knowledge in a supportive environment and, thereby, empowers them to be autonomous learners. To achieve this, the learning cycle should provide a means for learners to interpret and reflect on their own learning and construct alternative meanings to expand their perspectives.

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as well as (b) if the teachers' strategies tend to decrease or increase such value conflicts.

In order to analyse the results of the survey, I will introduce a pair of theoretical assumptions: (1) A distinction between individualist values, predominant in secular societies, and collectivist values, predominant in religious societies. (2) That teachers' strategies for handling controversial issues, through routines and working methods, influence the values which are reproduced in education. Even though the following study is too small to provide any far-reaching conclusions, I will argue that it still may: indicate a possible research area as well as present some potentially fruitful ideas for forthcoming and more comprehensive studies.

## 2. Background

In the research literature on controversial issues, it is common to distinguish between different characterizations. Some of these descriptions are based on an epistemic criterion, i.e., that the controversy is related to questions of knowledge or facts, whereas others are based on a political or behavioural criterion, i.e., that the controversy is related to questions of values or norms [6, 7]. In this paper, I will focus on the latter kind, where controversial issues are understood as topics that challenge or violate the prevailing ideals, norms and values in a given context.

The point of departure, for the following reasoning, is that values are something that individuals or groups strive for and try to realize [8]. This means that values are closely related to human needs, interests and well-being. In order to analyse the empirical material, I will make use of a distinction between individualist and collectivist values. This is a well-known distinction, in social and cultural psychology, that can be used to describe, analyse and understand differences between various societies and cultures [9, 10].

as well as (b) if the teachers' strategies tend to decrease or increase such value conflicts.

## 2. Theoretical Background

In order to discuss if the controversial issues, RE teachers face in secondary school, can be interpreted as value conflicts we will use the distinction between individualist and collectivist values. Individualist values, on the one hand, are characterized by individual rights being perceived as more important than obligations to others. These values are predominant in secular societies and tend to emphasize autonomy and self-realization.

Collectivist values, on the other hand, are characterized by obligations towards others being perceived as more important than individual rights. These values are predominant in religious societies and tend to emphasize common beliefs, practices and goals [6].

This distinction can provide a picture of which values that are considered important in different contexts but also give an indication of which questions that are likely to challenge the majority view, divide people, and become controversial. This point is particularly relevant since Sweden, according to extensive international studies, is the most secular country in the world [7].

In previous studies researchers have identified different strategies teachers use to deal with controversial issues in the classroom. Stradling found that educators often tried to act neutral, balance different views, play the devil's advocate, ally with marginalized pupils, or support the official line [2]. How teachers choose to organize their activities, through different routines and working methods, have also been highlighted as consequential for which values that are reproduced in teaching [8]. Thus, the way in which teachers treat controversial issues can contribute to increase or decrease value conflicts in the classroom and make some rather than other issues controversial.

## 3. Previous Research

There are two main ways to understand the purpose of RE in school, from an international perspective, as confessional and non-confessional. If the subject is understood confessional the aim is to socialize the pupils in a religious faith. In confessional RE, issues that concern, e.g., gender roles, sexuality, terrorism, and creationism vs. evolution are identified as particularly controversial [cf. 9-12]. If the subject is understood as non-confessional the aim is to give the pupils an opportunity to learn about different religions. Some examples of issues that researchers identify as controversial include ethical dilemmas, extremism, terrorism, Islam, and religiosity [cf. 13-15].

There is relatively little research on how controversial issues are handled in confessional and non-confessional RE. However, some studies suggest that pupils who participate in confessional education become aware of that the controversial issues they encounter in teaching often consist of a conflict between collectivist and individualist values [10-12]. At the same time, other studies suggest, that pupils in non-confessional RE do not become aware of these patterns. Rather, they regard themselves as liberated from traditional structures and express tolerance of "others" with religious beliefs who are described in stereotypical terms [13-15].

## 4. Method

A web-survey, consisting of open-ended and closed questions, was designed in order to investigate which issues RE teachers (N 71) in secondary school consider to be controversial and how they state that they deal with them in their pedagogical practice.

The teachers were briefed of the general purpose and invited to participate in the study under the condition that they could discontinue at any time. The participants were informed that their answers would be anonymous, treated as confidential, and used for research purposes only. During the study no personal data were stored and no questions of sensitive character were posed, e.g., concerning political, philosophical or religious conviction. In this way, compliance to the general research ethical principles of informed consent, anonymity, confidentiality, and secrecy was ensured [16].

The analysis of the answers was based on an open coding of words, phrases and expressions that recurred in the empirical material. Some of these were possible to identify as overarching themes (e.g., "Islam" or "ethics") and other more specific answers were related to them (e.g., the "veil debate" or "animal rights"). The discussion, as to whether the controversial issues could be interpreted in terms of conflicts between individualist and collectivist values, and whether teachers' strategies contributed to increase or decrease any possible value conflicts, were primarily based on the theoretical background above. It is important to emphasize that the purpose of this investigation is not to draw general conclusions about RE teachers but to use a mainly qualitative material in order to track tendencies among this group [18-19].

## 5. Result and Discussion

The teachers who participated in the survey were asked to state the controversial issues they deal with in their teaching and the answers can be categorized in three themes. First, they indicated that issues concerning conflicts of various kinds was controversial. The participants stated that they dealt with controversial issues related to, e.g., "interpretations of religions", "religious conflicts", and "religiosity and atheism".

Second, they also considered Islam, in general, as a controversial issue. The participants stated that they treated issues related to the "veil debate", "honour culture", and "oppression". Third, the participants regarded issues concerning "moral and ethics" as controversial in RE. Again, the teachers specified their answer with issues related to, e.g., "sexuality", "abortion", "euthanasia", "animal rights", and "capital punishment". What appear to be controversial in an individualistic secular context can be understood as issues that challenge the prevailing values within the community [20]. Issues that seemingly relates to incompatible beliefs or truth claims, such as whether or not to have a religious belief, is also something that may violate an implicit secular norm which the pupils may not be aware of and is difficult to discover.

The participants were asked to indicate which strategies they use to deal with controversial issues in teaching and given an opportunity to justify their choices. What emerged was that a majority indicated that they sought balance (79%), supported the official line as stated in the governing document (72%), and acted neutral chairman – when controversial issues were addressed in the classroom (49% partly like me, and 35% like me or very much like me). The fact that teachers tend to strive for, i.e., balance and neutrality, seems to contribute to convey individualist values to the pupils, who are expected to make independent decisions and take responsibility for their choices.

At the same time, only a few of the RE teachers stated that they expressed commitment (13%), took side with marginalized pupils (15%), or played the devil's advocate (22%). It is of particular interest, that only a small fraction of the RE teachers that participated in the study, stated that they allied with marginalized pupils – which could promote collectivist values such as solidarity. Similarly, only a limited proportion of the RE teachers stated that they use to play the devil's advocate, which can bring about a critical examination of inherent ideals, norms and values which otherwise often is taken for granted.

Thus, it seems that how controversial issues are treated can contribute to convey individualistic ideals, norms and values. Nevertheless, there are interesting exceptions in the empirical material where teachers work deliberately with pupils' self-understanding and critical distance.

## 6. Concluding Remark

What appears to be controversial within an individualistic secular context can be understood as issues that challenges the prevailing values within the community. The fact that teachers to a large extent strive for, e.g., balance and neutrality in teaching seems to contribute to convey individualist values to the pupils who are expected to make independent decisions and take responsibility for their choices. This means that they risk reinforcing the predominant individualist values and contribute to continue to construct collective values as controversial in education.

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# Educator Diversity and Student Accomplishment

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## Abstract

*There are many factors that contribute to a student's academic and personal performance within the context of their PK-12 Education. Independent of atypical developmental abilities, family wealth is a significant factor in student performance. Other factors, endogenous to what happens within school, include community resources, with a particular focus on sustained financial support for schools. Although the overall performance of a particular school is driven by the relative wealth of the students in the school, the level of language proficiency among students within the school, and the percentage of special needs students in the classroom and building, the variation of performance between schools with similar populations is driven by the effectiveness of the educators in the building [1]. If we are going to close the various achievement gaps that plague our educational systems, a focus on how to prepare, recruit, and retain highly effective educators, particularly within our high needs and culturally diverse schools, is a national imperative.*

*Keywords: Diversity Student Accomplishment*

The Organization for Economic and Cooperative Development [2] has established a vision for the future of education around which the international community of educators are drawn to organize. Given the OECD's responsibility for the Programme for International Student Assessment [3], it is reasonable to accept the interpretation that they are focused on the measurable outcomes of the educational process. In fact, the OECD focus on the future of education is on what we need to do to prepare our children to engage in productive and meaningful lives. It is also true that they organize their work, and reports, around the needs of our children, with a particular focus on appropriate and effective curriculum. The focus of this essay is to encourage educators (scholars, practioners, and policy professionals) to centralize the role of human capital, particularly the educator in the classroom, to the process of education. In particular, this essay will address the importance, and challenge, of recruiting and preparing educators who represent and/or meet the educational needs of our historically disadvantaged students.

This essay will be framed within the context of the United States with the encouragement for all us to translate these ideas into the international context.

There is growing evidence that, to improve our overall performance and serve all of our students, we need to organize around the needs of historically disadvantaged students in every school and in every classroom. These historically disadvantaged students come from ethnic and racial groups that have faced systematic discrimination (in the United States that would be Native, African, and Latin Americans), students who

come from non-dominate culture language speaking families (in the United States that would be English Language Learners – ELL's), and students who are atypical learners.

In addition to these groups, for whom our educational systems are not organized to serve, it is important to recognize that children coming from lower-income families who do not come into our classrooms with the social capital needed to survive let alone flourish in our educational systems. Our current educational systems are designed to meet the needs of children coming from dominant cultural groups who have the economic resources to provide quality health care, stable housing, healthy diet, and access to out of school learning opportunities that advantage their children's ability to succeed in our schools. As we develop systems to meet the needs of all of our children, we need to focus on what educators need to know and be able to do to meet the needs of all children, not just the privileged.

To meet these needs, we must recruit, prepare, and retain educators whom our students, particularly our disenfranchised students, can see as role models and who have a deep understanding of those students' lived experiences. It is a logical hypothesis to speculate that educators who share their students' lived experience are excellent candidates for our classrooms. This hypothesis drives the hiring practices of selective independent schools who are often eager to hire their own alumni and/or alumni from similar schools. There is growing evidence that racial or ethnic matching has a significant impact on student achievement [4] and that increasing the percentage of minority teachers in a school, has a positive impact on minority student performance, even if the students do not have an ethnic minority teacher [5]. There are, unfortunately, substantial barriers to our ability to recruit and retain culturally and linguistically diverse educators.

These barriers include, but are not limited to, a) challenges to recruiting culturally and linguistically diverse (CLD) individuals into programs that prepare educators, b) challenges in retaining CLD individuals in these programs, c) challenges in preparing all educators to be effective working with CLD and atypical students, d) recruiting CLD educators into CLD serving schools and districts, e) retaining those educators, and f) recruiting, retaining, and promoting CLD educational leaders. This essay will describe these barriers and finish with proposed solutions.

## Recruitment of Culturally and Linguistically Diverse (CLD) Students into Educator Preparation Programs

In the United States, very few educator preparation programs have a student body that represents the cultural and linguistic diversity of the national population. This is one of the reasons that it is difficult for school districts to recruit CLD educators, as they are not being prepared through the normal process. There are several reasons why CLD students are under-represented in the educator pipeline. The first is that the few CLD students who qualify for entry into colleges or universities are being attracted to the field of education. Although, particularly for African American women, teaching in PK-12 schools was a traditional avenue for employment, the combination of the civil rights and women's rights movement has expanded their range of opportunities, thus reducing the number of African Americans who are seeking to enter the educator workforce. Prior to de-segregation in the United States, being a teacher was one of the prized professional positions among all people of colour. Like White women, the economic opportunities for men and women of colour now draws them into medicine, law, business, the media and elsewhere. That pool of recruits for education has dried up [6].

The second reason that CLD individuals do not seek to become teachers is the perceived low status of being a teacher in the United States. Although becoming an effective educator requires a complex set of intellectual, pedagogical, and social skills,

teaching is mis-perceived as being intellectually undemanding work and as not having a high social value. (One wonders if this estimation will change as a result of the enforced home schooling that the 2020 Covid-19 pandemic has created). One of the downsides of using the union structure to improve the quality of working conditions among educators is that they become associated with occupations that do not demand a college degree or ongoing professional certification in order to be effective. Rather than being a part of professional associations, as are lawyers, doctors, or engineers which create standards for working conditions and professional competencies, educators are represented by unions for their working conditions and then other organizations (e.g., state departments of education working with institutions of higher education) to set the professional standards. The lack of coherency does not support a perception of professional, which limits the respect associated with the work. The fact that it is seen as "women's" work is another reason for its lower status. In the United States, the lack of a national standard of professionalism and working conditions conspire to reduce the perceived status of being an educator.

The third reason that CLD individuals, and others, are not attracted to become educators are the working conditions of educators. Being an educator is emotionally and intellectually demanding work. The working conditions are rarely constructed to support educational professionals in their efforts to improve the quality of their performance. An example of this dilemma is being a secondary school English language arts (ELA) teacher. Best practices expect that, to learn ELA well, one must read and write a lot. In fact, writing regularly and getting timely feedback on your writing is the path to proficiency, To support this progress, an effective ELA educator would need to be reading 180 papers at least two times a week (six classes times 30 students), in addition to lesson planning, departmental meetings, school wide meetings, student advising, and supervising clubs or sports. Because this is too much, ELA teachers ending up reducing the amount of required writing which inhibits student accomplishment. Because of inadequate working conditions, more than 50% of new educators are out of the field within 3 years. Some of that may be driven by making an inaccurate career choice or changing expectations between being 18 and 21, but most is driven by the deeply unsatisfying work conditions, low status, inadequate professional support, and lower reimbursement in relationship to similarly prepared peers.

A fourth barrier for CLD individuals into educator preparation programs is the weaknesses in our PK-12 system that do not fully support the academic aspirations of CLD students. The achievement gap between CLD students and euro and Asian descended students remains pronounced. This gap exists within majority serving school districts and minority serving school districts. A function of this gap is that CLD students are less likely to get into colleges and universities than their non-CLD peers, particularly selective schools are. The serves to depress the size of the pipeline of teacher candidates who have the strong academic skills that are an important part of the effective teachers tool box.

**Challenges in Retaining CLD Individuals in Educator Preparation Programs**

Once a CLD individual has overcome the barriers to getting into an educator preparation programs, there are challenges they have to overcome in order to graduate.

A significant challenge is financial [7]. The cost of a college education is the same if one is heading into business, health, the arts, or education. The financial rewards of these choices, however, are not the same. Retaining strong students of colour in educator preparation programs is challenging when they learn more about other opportunities that have a greater financial reward or allow them to explore their

commitment to improving society in a more high-status context than PK-12 education.

In addition, there is often a lower level of financial assistance available to those who are seeking a teaching degree as opposed to a degree in the STEM areas. In my own institution, I saw a reduction in dedicated scholarships for education majors which had a direct impact on the number of students who choice to come into our program.

A second challenge is the lack of CLD individuals who are on the faculty of education, or in the schools in which students get their clinical training [8, 9]. This lack of role modelling makes it difficult to learn how to persevere in the face of the rigorous demands associated with becoming an educator. There is also evidence that education programs, which have a predominately-white faculty, can be experienced as a hostile environment for CLD students. [10] Given the pre-dominance of euro-descended educators in the work force, this lack of mentoring from CLD professionals, can made it difficult for CLD students to see themselves in the profession. A related challenge is that the curriculum in educator preparation programs are designed to prepare educators to become proficient in a profession that is not meeting the needs of CLD students in our PK-12 system. The lack of training in culturally and linguistically relevant pedagogy can lead to frustration among CLD students and a reason that they seek opportunities elsewhere [11, 12].

A commonly identified challenge to CLD students' progression to being certified as an educator has been the introduction if standardized academic tests as part of the requirements. Many education programs make passing those tests a pre-requisite for becoming a major and/or receiving certification by the State. Given the high probability that CLD students came from less effective PK-12 educational backgrounds, it is not surprising that they under-perform their euro-descended peers on these tests. It is another reason that they do not graduate from these programs at the same rate as their non-CLD peers [13].

## Challenges in Preparing All Educators to be Effective Working with CLD and Atypical Students

Given the persistent achievement gaps between CLD and Atypical students, and their euro-descended and typically developing peers, there is a growing focus on developing and implementing curriculum that is designed to meet the educational needs of all children. In this essay, this will be referred to as culturally and linguistically relevant pedagogy (CLRP) which is a multi-faceted approach to being able to adjust one is teaching to meet the needs of all the children in a particular classroom, school, or district.

To close these persistent achievement gaps, the successful approach must be comprehensive and systematic. Unless educator preparation programs commit to engage in this comprehensive and systematic approach, attempts to implement CLRP will fail. For any curriculum reform to be successful, it must recruit and retain an educator corps that has the skills and dispositions to implement these reforms. Since most educators are recruited from educator preparation programs, they must take the lead in preparing all of their students to be proficient in CLRP, not just those who are going into CLD serving schools or districts. The barrier to accomplishing this goal are the skills and dispositions of the faculty in educator preparation programs. They must learn how to use CLRP, within the context of their discipline (e.g., STEM), and how to create classroom and clinical experiences that facilitate the acquisition of this competence for their pre-service educators. This would not only increase the percentage of educators who are prepared to address the achievement gap within their schools, it will make the professional more attractive for CLD candidates [14, 15, 16].

## Recruiting CLD Educators into CLD Serving Schools and Districts

Most educational systems in the PK-12 or Higher Education settings face numerous challenges to increasing the percentage of CLD educators in their school. As outlined above, there are several barriers to the recruitment and preparation of effective CLD educators. The pool of qualified candidates is small. At the same time, there are no systematic recruitment processes through which educators are recruited. Each school district has its own process that is lightly regulated by the State and deeply influenced by the union contract with the district. Recruitment is also significantly regional with most educators working within 60 miles of educational preparation program in which they received their training. This means that, even if an educator preparation did an outstanding job recruiting and preparing CLD students, there is no structured pipeline into a district on which the candidate could count. Each year, the openings are determined by a loosely aligned set of factors that determine how many and where are the openings in the district. Highly successful industries, or companies within industries, have systematic ways to identify and recruit highly qualified candidates, often when those candidates are in their degree programs. PK-12 education would be well served developing a more systematic approach to recruiting highly qualified educators [17, 18].

Current practices involve the district posting an opening to which qualified applicants apply. After going through the initial human resources process, most applicants' file comes to the desk of a building principal who has the most influence on the final decision.

As with hiring in all industries, the principal will determine initial qualifications (e.g., certifications, quality of educator preparation program, grades) and then there is the issue of "fit." In the interview, can it be determined that this candidate will make a good member of the team? These practices serve to support the system, as it currently exists.

As such, it does not serve those who are coming from outside the curriculum. As a result of historical discrimination, CLD candidates are less likely than their euro-descended peers, to have the right qualifications, come from the right preparation program, or be an initial "fit" for a traditional team. To significantly increase the percentage of CLD educators, substantive changes needs to be made in the recruitment process.

To start, the district most communicate in word and deed that it wants to increase this percentage. It must become active in recruiting from educator preparation programs that have a reputation for producing educators who are proficient at providing culturally and linguistically relevant pedagogy. It would be a significant advantage to the district, the educator preparation program, and the candidate if the relationship with the candidate could begin as part of their pre-service clinical training. Such an effective working relationship would help with the educator preparations program efforts to recruit CLD students. We do understand than many others would prioritize the recruitment of CLD candidates over the CLRF proficiency of all candidates. We organize our thinking around the hypothesis that we need all educators to be CLRF proficient *and* that increasing the percentage of CLD educators is a significant value added. We hypothesize that a focus on CLRF proficiency will drive more significant and sustainable system change than will just a focus on the percentage of CLD educators in the district.

The next is to begin to address the barriers to hiring the strongest candidates as early in the process. Districts that allow seniority to drive their hiring process have a difficult time making early offers because each time a position is open, making it first available to teachers in the system slows the process down. By treating each position independently, the district will deepen the pool of qualified candidates.

The third step is to have a part of principal and superintendent evaluations their success at increasing the percentage of CLRF proficient and CLD educators in their

school and district. A comprehensive human capital plan needs to be developed, implemented and track in order to be successful over a 10-year period.

The fourth step includes creating programs that helps grow the pool of potential CLD candidates for positions in the school and district. One common approach to achieve this goal is developing programs that help CLD para-professional attain degrees and certifications. The other is to begin to work with CLD secondary students who are interested in becoming educators to facilitate their matriculation into effective educator preparation programs and provide incentives for them to, at least, start their career in the district from which they graduated.

## Retaining CLD Educators

Working conditions and opportunities to advance as a professional are two key factors in the retention of all educators. Given that CLD educators too often experience a culturally disenfranchising, if not hostile, work environment, these factors are intensified. In particular, it is a common finding that CLD educators receive systematically lower evaluations from their non-CLD supervising principals. It follows from these evaluations that CLD educators will have fewer opportunities for advancement within the system. Since fewer CLD, educators will become teacher leaders, department heads, principals, or superintendents, within such a system, such a system will remain unattractive to CLD candidates. To retain CLD educators, this cycle needs to be affirmatively changed.

It is one of the areas where leadership, from the School Committee and Superintendent matters. Making demonstrable success in the recruitment, retention, and advancement of CLD educators a part of metrics for success in the district, the superintendent, and principals' evaluation will help make this a priority. As a priority, leaders in the district will engage in the professional development they will need to be effective in the recruitment, retention, and promotion of CLD educators. In order to maintain progress over time, time during which superintendents and school committee members turn over, a successful district will develop and commit to a multiple year plan for increasing the percentage of CLD educators in the district and make progress on this plan a part of everyone's annual evaluation. We hypothesize that there will be more success in districts that have a similar plan for increasing the percentage of CLRF proficient educators in the district.

## Recruiting, Retaining, and Promoting CLD Educational Leaders

There is an active debate in the industry as to the importance of the teacher in the classroom versus the leader in the building or district. There is research to support both sides of the debate. As we search for an empirical answer to this question, we advocate for a both/and approach. We hypothesize that we need both great teachers in the classroom and great leaders who support those teachers' efforts to meet the academic and social needs of all of their students. It will take a great leader to change the working conditions in a building or district so that it is welcoming and affirming to CLD educators and it will take CLRF proficient educators to effectively meet the needs of all children in every classroom. The arguments for having CLD leaders is the same for CLD teachers.

They will share the lived experience of their students and educators. They will have overcome the barriers that face all CLD educators to join the profession and become leaders in the profession. As they join the decision-making groups in the building and district, they will have the practical wisdom to create the conditions for success.

The process of increasing the percentage of CLD leaders in a district is the same as

CLD educators. The district needs to make an affirmative commitment to and plan for increasing the percentage and build those expectations into the superintendent's evaluation. The district needs to build a collaborative relationship with its higher education partners to develop educational leadership programs that prepare principals and superintendents to implement educational systems that designed to meet the OECD 2030 goals *and* are gap-closing districts. It is also critical to demonstrate that the district is eager to grow their own leaders and promote from within.

**Conclusion**

There are lots and lots of great work that occurs in education. It is exciting. It is innovative. Most of it is directed to meeting the needs of our children. It also tends to be episodic and personality driven. As pointed out by Coleman [19], successful educational improvement needs to by comprehensive and systematic. If, as the data suggests, having CLD educators in a district is necessary for that district to close achievement gaps, districts need to make long-term commitments and investments to make that happen. It will take time to see the return on these efforts. One image to keep in mind will be the new Superintendent who 25 years ago joined the grow your own pre-teacher program as a ninth grader in the district in which they are now becoming the chief executive.

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# Generation Z Is Going to Work. What Are its Expectations?

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## Abstract

*The first wave of Gen Z is starting to graduate from college and is rapidly entering the workforce. But what is Gen Z expecting from a workplace? We aim to answer this question in this qualitative study. Through a survey with open questions, we asked 57 university students from Generation Z to state their opinions regarding the perception about themselves and the expectations regarding a future job and employer. One of the main findings is the increased interest in having an understanding and supporting superior. The respondents rejected the traditional idea of a boss, wanting a supportive leader who motivates them. The number of Gen Z employees will only increase in the next years, thus we consider that this research is valuable for employers, human resource specialists, and educators who want to smoothen the transition from academia to the work environment.*

*Keywords: Generation Z, job expectations*

## 1. Literature Review

It is widely accepted that Generation Y was born between 1981 and 1994, and Generation Z between 1995 and 2010 [12, 21]. Generation Y is the first technological generation [10] with strong ambition, good communication skills [11], multi-tasking [4] and having success, career, and money as top priorities. Being the first digital native generation, Gen Z is also called Post-Millennials, Centennials, Digital Generation, Digital Natives, .com Generation, Facebook Generation, iGeneration [20]. They are characterized by freedom, individualism, addiction to technology [15], speed, entrepreneurial spirit and a "do-it-myself" mentality [6].

The "Younger Millennials", born between 1989 and 1994, and generation Z, have new values and life goals, different employment requirements [16] and more realistic expectations [5, 37] than Older Millennials (born between 1981 and 1988 [14]), because they have lived in harsher economic realities. Their independent and entrepreneurial view is carried over to the workplace, where frequent feedback is disliked and independent work is preferred over teamwork [2]. This could be explained by their constant virtual communication, which affects their listening and socialization skills [1].

They want employers who will accept their free spirit and will not micromanage them, giving them the opportunity to develop themselves. They want to be valued by their employers, feel that their efforts are making a difference and have financial benefits as a result [8]. Less loyal, they are frequently called job-hoppers, being three times more prone to change jobs than their predecessors [19]: 30% from Generation Z is more likely to quit the first job in less than a year, men being more likely to quit faster [13].

Even if they prefer independent work, they value communication. In a study from 2015 [19], communication was a key factor, 43% stating that they would get irritated by

poor communication with colleagues. In terms of benefits, along with good salary, they appreciate a flexible schedule and remote work [7]. Furthermore, they seek jobs aligned with their values. Personal relationships, growth and learning opportunities and simply enjoying work are important [21]. They want a culture that enables change and has a technology-driven environment. They do not like to rely on traditional office hierarchies and the main traits appreciated in a leader are inclusivity, curiosity, self-motivation, generosity, perseverance [9]. A study conducted in 10 countries [18] revealed that 61% of Gen Z wants leaders who listen and value their opinions, and 46% values managers who allow them to work independently. They perceive themselves as having good technical skills and fresh thinking. At the same time, they are self-critical, believing they should improve communication skills, conflict handling and meeting deadlines [17].

Regarding higher education, they want to be part of the learning process, representing the generation that learns by doing, enjoys interactive classes and expects digital enhancements to traditional learning. Therefore, it is the perfect timing for educators to embrace innovation [3].

## 2. Methodology

In this qualitative study, we explore the expectations of Gen Z in a future job. Our research questions are:
- RQ1: How does Generation Z perceive itself?
- RQ2: What are its expectations in a future workplace?

We created a questionnaire with 7 open questions and recruited 57 students (26 men) from Generation Z in a faculty of business from Iasi, Romania. Questions 1-3 asked the subjects to assess their strong and weak points. Questions 4-7 referred to a future job: ideal job, criteria when choosing an employer, reasons for leaving a job.

We established a set of codes through content analysis. We started open coding upon the second reading of the transcripts, when we coded each question separately and we completed a codebook with categories, subcategories and codes.

## 3. Results

The first three questions asked the subjects to assess their strong and weak points.

We grouped them into categories: work-related (83 codes for strong points, 50 for weak points), communication (33 codes, respectively 14), personal attributes (27 codes, respectively 20), positive attitude (19 codes for strong points), critical thinking (19 codes for strong points), and teamwork (18 codes, respectively 5), emotional health (31 codes for weak points). The most frequent quality is ambition, followed by being responsible, curios, open to changes and adaptable. The respondents also mentioned qualities such as patience, punctuality, being organized, ability to manage crises, attention to details, critical thinking. At the same time, the subjects admit that their generation is more immature, lacks patience and is more stubborn. Stubbornness is considered both a quality, associated with ambition, and a weakness, interfering in social relationships.

Some students admit on lacking patience and getting annoyed easily. The lack of patience can be related to a lack of team spirit. However, in comparison, more respondents mentioned qualities helpful in a team: friendliness, team spirit, tolerance, and empathy. Teamwork can be also related to communication, another important perceived skill. While 26 subjects described themselves as good in communicating or listening, 14 admitted about having struggles in communicating: they cannot express themselves or are afraid of public speaking. Furthermore, the need for extrinsic motivation is a recurring theme in the study. Other weaknesses mentioned are the

inability to keep focus for a longer period, superficiality and not knowing what that they want. Emotional health is frequently mentioned. Even though 15 respondents mention their positive attitude, there were more mentions (25) regarding poor emotional health: lack of self-confidence, fear of failure.

Regarding the expectations in a future job, we established the following categories: the boss (132 codes), fulfilment (88), team (45), work environment (44), encouragements (28), salary (26), communication (23), and leadership (10). Our respondents reject the idea of a boss, wanting an understanding and supportive leader, who knows how to motivate them and who values them. Thirteen respondents said that they would leave a job because of their boss. Some students would dislike the boss' superior attitude towards them or any employee. Nonetheless, the respondents focused also on the hard-working side of the leader: they said the leader should be serious, ambitious and should strive for performance.

A sense of fulfilment in a future job is also important. The students want a workplace where they "continuously develop" themselves, get promoted, and they want to work for pleasure. Unfulfillment derives from the impossibility to advance more in a job, a feeling of not fitting in, a lack of challenges or routine. In the workplace, they want a sense of belonging, a friendly team, valuing good working relationships. The team can help create a welcoming work environment, which is frequently mentioned, while an unpleasant work environment is a reason to abandon a job, the same as a lack of communication in the team. Furthermore, we identified our respondents' constant need of being encouraged and motivated and their fear of reproaches. They display a constant need for validation, being unsure of their capabilities. However, they want to take leadership roles. There are subjects who mentioned that the perfect job would be as a manager or a job where they feel they have power. For some respondents, a fair salary, aligned with the market, represents a reason to leave or choose a job. Furthermore, the desire of having a flexible work schedule and the possibility of working remote were mentioned.

## 4. Conclusions

We explored the expectations of Generation Z regarding a future job. We have found that our respondents consider themselves ambitious, even stubborn, eager to embrace challenges, open to change. Although tech-savvy, they appreciate face-to-face communication, while admitting they have to improve it. Also, they know they need external motivation, have emotional health issues and a strong fear of failure. This fear is associated with a lack of self-confidence and with the continuous need to be appreciated. Educators can offer them better emotional support in this sense.

Regarding expectations in a future workplace, we have identified two important desires: to have a leader, not a boss, and to feel fulfilled in a job. The feeling of fulfilment comes from being appreciated in the workplace and from constant growth opportunities.

Our respondents need to be encouraged and valued. The need of belonging in the workplace is identified as well. However, there are limits of this study. For extrapolating the results, the research should be continued with a large-scale quantitative study.

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# Preconceptions of Gifted and Ungifted Pupils of Younger School Age on the Selected Phenomenon "Learning"

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## Abstract

*The subject of this paper is the area of children's thinking, especially the area of preconceptions, creating ideas about certain phenomena that surround children during their development. These phenomena are perceived as determinants of thinking. Preconceptions are constructed concepts of various objects, things and phenomena that have arisen from individual's experience with objects or phenomena, as well as other impacts (family, school, media, etc.). Preconceptions also include the emotional relationship, attitude and opinion of certain phenomena that an individual creates through experience. Based on the importance of understanding preconceptions for the development of cognition (thinking and ideas) about phenomena, our goal was to identify and compare the preconceptions of gifted and ungifted pupils of younger school age. Knowing the personality traits of gifted children (whose development is characterized by irreversible developmental advances, and the spectrum of their manifestations often ranges from hyperactivity through significant activity to introversion) is the basis for their understanding. These personality traits and characteristics of gifted individuals are a prerequisite for special and professional approach of teachers, with the aim of quality and balanced personality development of individuals of this population. The level of pupil's thinking should be the priority for each teacher. In the presented work we understand talent as a certain phenomenon posing a challenge for a completely different approach and grasp of children's thinking in education. Therefore, we were interested in whether there are differences in the level of preconceptions among gifted and ungifted pupils in primary education.*

*Keywords: preconceptions, gifted pupil, young school-age pupil, meaningful education*

## 1. Introduction

An individual learns and gets to know the world throughout all his/her life. One of the most important periods is the pre-primary and primary education when a child acquires information from everyday life, with which he/she comes into contact, and on the basis of which a child develops certain ideas about the functioning of the world. School is a place where these ideas can be modified into a meaningful knowledge structure by proper teaching. In the current information age, there are many pitfalls that can disrupt, twist, distort or prevent the process of learning and correct understanding of individual pieces of information, and thus lead to misconceptions. Getting to know pupils' preconceptions plays an important role in their continuous and effective education. If we want to teach pupils a new concept comprehensively, we must start with known experience and what they have already come into contact with [1].

## 2. Role of Preconceptions in Education

Doulík and Škoda [2] define preconceptions as individual characteristics of each person, formed by all previous influences and experiences affecting the individual throughout his/her life. Similarly, Smolleck and Hershberger [3] characterize the term, according to which children are constantly researching and exploring their surroundings, thus creating naive grasps (preconceptions) of the world they live in. According to Duit, Treagust, and Widodo [4], preconceptions are mental models of objects and phenomena in the learner's mind. The basic source of children's preconceptions are cognitive processes, based on which they attribute importance to phenomena around them, they create a certain comprehensive idea of this world that, in this way, becomes meaningful for them.

Although cognitive activity is a key source of preconceptions, we cannot consider them only at this level, given the wide and diverse range of influences involved in their formation and modification. Doulík, Škoda [2] and Lee, Pang [5] present two basic groups of factors influencing preconceptions:

- exogenous (social, economic, e.g., family, school, media and other micro/meso and macro environments);
- endogenous (based on the personal psychological and biological characteristics of an individual).

Based on the above factors, together with the active involvement of a pupil in an activity, the modification of preconceptions is carried out in terms of quantity and quality.

By observing the environment, experimenting with materials and objects, playing and discovering new concepts and connections between them, pupils form a comprehensive knowledge structure that needs to be further utilised. In this way we can ensure effective achievement of the pupils' learning performance.

This means that the pupil will have a meaningful and comprehensive knowledge structure (not only be able to name the concepts, but also to understand the relationship between them, evaluate them and draw conclusions). In terms of specific characteristics of gifted children, we conclude that these preconceptions will differ significantly compared to peers, because, in addition to the above factors, the creation of preconceptions, as stated by Kosíková [6], is significantly affected not only by the nature, but also the level of thought operations, breadth and depth of learning concepts, and building relationships between them. It is necessary for the educational process to be differentiated with regard to preconceptions of children based on their personality characteristics, which are largely involved in their formation and modification in the educational process itself. Therefore, it should be taken into account that giftedness is a specific phenomenon in education. For this reason, the preconceptions of gifted children are no exception. They should not be overlooked, but treated as a starting point, and in this way, teachers should reflect and develop specific personality of gifted children in schools.

## 3. Methods and Participants

The aim of the research was to identify and compare the preconceptions of gifted and ungifted pupils of younger school age about the phenomenon of learning. Therefore, we were interested in the following:

- How do gifted and ungifted pupils understand the phenomenon of learning?
- What do gift and ungifted pupils think would be the consequences if learning did not exist (what significance do they attach to the existence of the phenomenon "learning")?

- What is the relationship and attitude of gifted and ungifted pupils to the phenomenon "learning"?

In order to identify preconceptions, we used the method of projective techniques, specifically the method of incomplete sentences. We used the research tool of our own design and created a sheet of incomplete sentences (incomplete sentences in question are listed in the results), which students spontaneously completed at their own discretion.

The sheet contained 36 incomplete sentences concerning 9 phenomena (learning, book, counting, meaning of life, loss, success, free time, friendship, family). However, in this paper we only process data related to the phenomenon "learning". 50 pupils of the 2nd grade of primary schools participated in the research, 25 of which were gifted and 25 were average or ungifted pupils.

## 4. Results

We evaluated the obtained data based on the principles of the analytical strategy using the constant comparative method and categorized the completed sentences with the content analysis. We further processed the data in the MS Excel program and interpreted them into clear figures and tables. We presented the evaluated data in the form of a summary protocol [7]. The evaluation can be found in the following figures and tables.

All statements of the pupils on the incomplete sentence **"Learning is when…"** are presented and evaluated in Figure 1 and Table 1. We categorized these statements into five semantic categories of how pupils understand the phenomenon "learning" (see Table 1). The most represented category was specific activities – pupils perceived learning as writing, reading, counting, sports, etc. For example, Pupil No. 8 stated that *"learning is when I put that knowledge into me"*. However, similar statements occurred only in the group of gifted students. This category was prevailing mainly in the group of gifted pupils (hereinafter referred to as GP), and thus by 44%. Ungifted (intact) pupils (hereinafter referred to as IP) gave only statements like (Pupil No. 20) *"learning is when we read a book"* or (Pupil No. 11) *"…when I write a dictation or read"*. The category of institutional understanding consisted of statements in which students mentioned mainly institutions or the educational environment where education takes place, such as (Pupil No. 9) *"…we are at school"*, (Pupil No. 22) *"…we have classes"* or (Pupil No. 25) *"…we have a lesson"*. Such statements were reported by the IP group by 16% more than in the GP group. Another category consisted of more general statements of the pupils, in which they stated only (Pupil No. 16) *"…we are learning something new"* or (Pupil No. 18) *"…we are educating ourselves"*. This answer was given only by the GP group.

Nevertheless, this category is represented approximately equally in both groups. In the category of naive understanding of the phenomenon "learning", we have included statements such as (Pupil No. 1) *"…the school bell is ringing"* or (Pupil No. 19) *"…it is a working week"*. This category is also represented in both groups approximately equally.

The last category includes answers like *I don't know* or we also included pupils who could not react or answer at all, which was represented only by IP 8%.
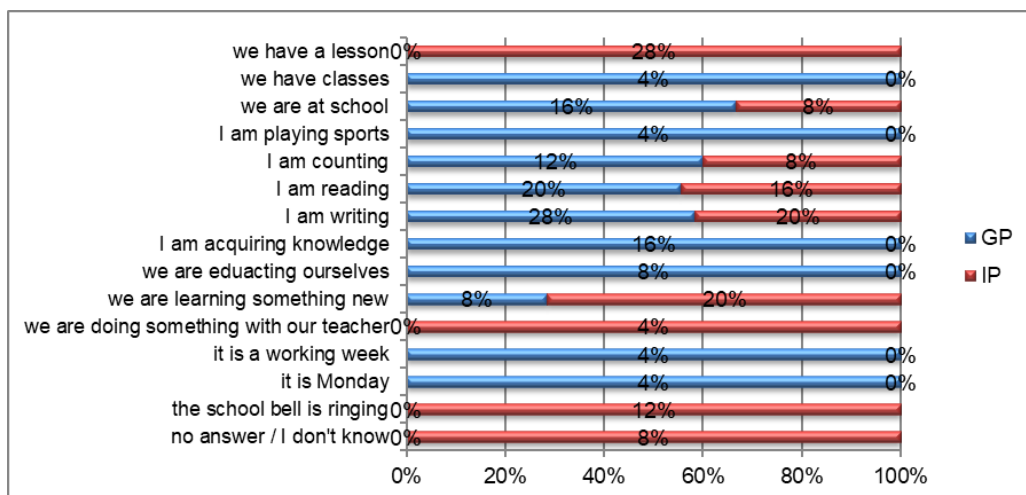
*Fig. 1. All Pupils' Answers to the Incomplete Sentence: Learning is when…*

| Semantic Categories | Total | GP | | IP | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Understanding as a Specific Activity | 31 | 20 | 80% | 11 | 44% |
| Institutional Understanding | 14 | 5 | 20% | 9 | 36% |
| General Understanding | 9 | 4 | 16% | 5 | 20% |
| Naive Understanding | 6 | 2 | 8% | 4 | 16% |
| No Answer or *I don't know* | 2 | 0 | 0% | 2 | 8% |

*Table 1. Comparison Table of Semantic Categories of the First Incomplete Sentence*

All the statements of students on the unfinished sentence **"If learning did not exist, then…"** are presented and evaluated in Figure 2 and Table 2. We categorized these statements into six semantic categories including the consequences that the pupils think there would be if learning did not exist (see Table 2). The biggest representation was in general statements where students stated ignorance as a consequence and thus if learning did not exist, (Pupil No. 26) *"…we would be stupid"*, (Pupil No. 32) *"…we would not learn anything"* or (Pupil No. 44) *"…nobody would know anything"*. In this category, IP answers are represented by 4% more. The GP group reported more specific consequences and thus by 20% more. In this category were included pupils' answers, in which they stated specific skills and abilities that they would not have developed in the absence of learning. GP also stated that they could not even work. Another category consisted of attitudes in which students showed what it would be like for them, if there was no learning. Here we included statements like (Pupil No. 21) *"…it would be terrible"* or (Pupil No. 7) *"…it would be bad"*. These answers were given only by GP. Answers with the opposite attitude were given by IP, e.g., (Pupil No. 39) *"…it would be great"*.

Another category consisted of statements in which students also stated social consequences, such as (Pupil No. 6) *"…we would do only bad things"* or (Pupil No. 18) *"…we would think of another way to make money"*. This category was represented only by the GP group. 8% of IP were represented in the category of naive consequences, (Pupil No. 26) "…I will be quiet" or (Pupil No. 37) *"…we would have to learn at home with our mothers"*. Even in this case, the last category consists of answers *I don't know* or we included pupil who could not react at all and answer, which was represented by 4% of the IP group only.
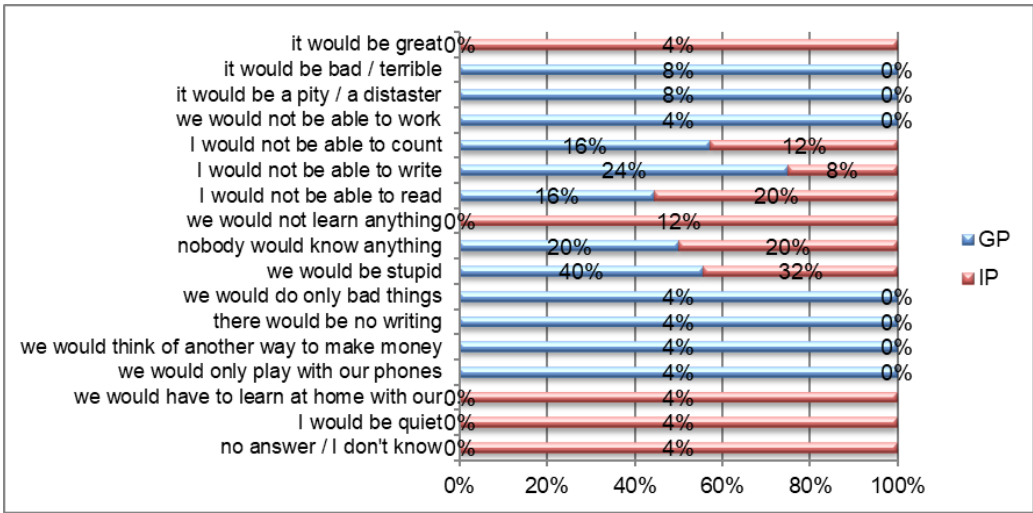
*Fig. 2. All Pupils' Answers to the Incomplete Sentence:*
*"If learning did not exist, then…"*

| Semantic Categories | Total | GP | | IP | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| General Consequences | 31 | 15 | 60 | 16 | 64 |
| Specific Consequences | 25 | 15 | 60% | 10 | 40% |
| Attitudes | 5 | 4 | 16% | 1 | 4% |
| Other Consequences | 4 | 4 | 16% | 0 | 0% |
| Naive Consequences | 2 | 0 | 0% | 2 | 8% |
| No Answer or *I don't know* | 1 | 0 | 0% | 1 | 4% |

*Table 2. Comparison Table of Semantic Categories*
*of the Second Incomplete Sentence*

All the pupils' answers to the incomplete sentence **"I would like learning to be..."** are presented and evaluated in Figure 3 and Table 3.
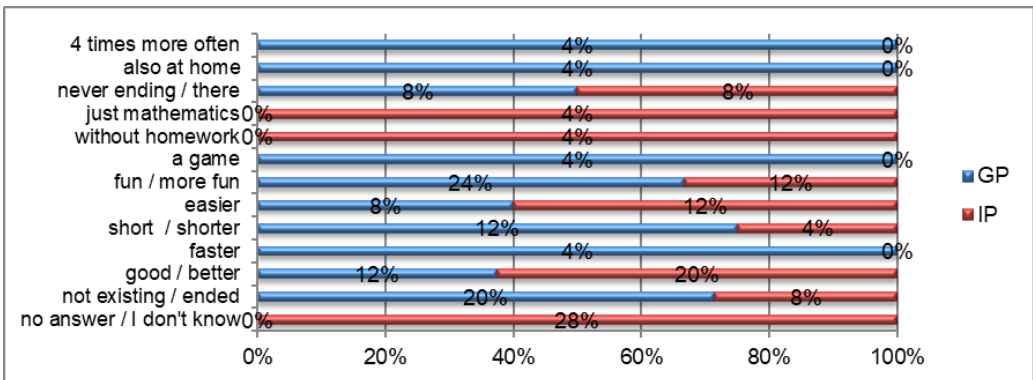


*Fig. 3. All Pupils' Answers to the Incomplete Sentence: I would like learning to be…*

| Semantic Categories | Total | GP | | IP | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Very positive perception of the phenomenon | 6 | 4 | 16% | 2 | 8% |
| Rather positive perception | 2 | 0 | 0% | 2 | 8% |
| Perception of the phenomenon as suffering | 5 | 2 | 8% | 3 | 12% |
| Perception of the phenomenon as boredom | 10 | 7 | 28% | 3 | 12% |
| Rather negative perception | 13 | 7 | 28% | 6 | 24% |
| Very negative perception | 7 | 5 | 20% | 2 | 8% |
| No Answer or *I don't know* | 7 | 0 | 0% | 7 | 28% |

*Table 3. Comparison Table of Semantic Categories of the Third Incomplete Sentence*

We categorized all statements into seven semantic categories of relationships and attitudes of pupils to the phenomenon "learning" (see Table 3). The largest representation were statements with a rather negative attitude. The pupils expressed their attitudes as follows: (Pupil No. 17) *"…shorter"* or (Pupil No. 2) *"…faster"*, which means that they would like learning time to pass faster or that it could be shorter. This category of attitudes was approximately equally represented in both groups. The second most common was the category of attitudes in which the pupils perceived learning as boredom, because they gave answers like (Pupil No. 13) *"…more fun"* or (Pupil No. 5) *"…a game"*. These statements were given in the GP group by 16% more than in the IP group. In the category of perceiving learning as suffering, we included statements like (Pupil No. 28) *"…easier"*. This category was also represented in both groups approximately equally. A very negative perception of learning was made up of statements in which the pupils stated that they would like learning not to exist or to end.

On the contrary, answers revealing a positive to very positive perception of the phenomenon "learning" were answers, such as (Pupil No. 26) *"…just mathematics"* or (Pupil No. 50) *"…there"*. These categories were equally represented in both groups, but GP showed greater enthusiasm in the statements, e.g. (Pupil No. 20) *"… 4 times more often"* or (Pupil No. 9) *"…also at home"* and the like, which we can see in Table 3 (in the category of very positive perception of the phenomenon). Pupils who neither answered nor wanted to express themselves or answered *I don't know* are included in the last category. There is only the IP group represented by 28%.

## 5. Conclusion

Based on the above, we evaluated that the gifted pupils had more specific and relevant answers compared to the ungifted students. They also had less representation in the category of naive understanding of the phenomenon "learning" and were able to comment on all questions. Gifted pupils perceive the consequences of the absence of learning or education and thus the significance of the phenomenon of learning more comprehensively and broadly, not only in terms of their person, but also within society.

This can be confirmed by their statements, in which they said that it would be terrible if there was no learning, and also stated that it could have an impact not only on social relations, but also on the workplace. We can see only minimal differences in attitudes and relationships to the phenomenon "learning". However, even in this case, gifted pupils stated to a greater extent that they are bored during learning, but, at the same time, gave more positive statements related to the phenomenon of learning than the ungifted pupils.

For this reason, we can conclude that gifted pupils like to learn, but with regard to education they require a more differentiated, richer content of education, so that they do not get bored and stay engaged. From this point of view, we perceive the identification of preconceptions in education as very helpful and beneficial – also with regard to more effective education of gifted pupils.

### *Acknowledgements*

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that has a safe and orderly climate in which students, teachers, staff, and administrators feel welcomed and supported is a pre-condition for learning [10]. We know that supporting the academic, social, emotional, behavioral, and physical development of children is also a critical component of the work of educating children [11]. We also know that when families are engaged in the process of schooling, outcomes for children are better [12]. We know that the quality of the interaction between the teacher and students, between the student and the content, and among students is the foundation of effective instruction [13]. We know these things yet, over the last thirty years we have not made the kind of progress we could have made. The question is why.

We advance the argument that the reason is twofold. First, we approach the work in a fragmented and episodic manner and that in order for us to improve outcomes for children and make a substantive change in their lives, we need to approach school improvement systematically. By systematically, we mean that those things that we know work need to be engaged in concert rather than one or two at a time. The second part of our argument is that we fail to approach the work developmentally. We see school improvement as a series of programs to be implemented rather than as an exercise in human, organizational, and community development. The thesis of this essay is that we know what the elements of an effective school are and that the reason that we have not made substantive progress is that we approach the work in a fragmented rather than systematic manner and have not taken into account the developmental nature of the work.

In this essay, we will attempt to make the argument that a research practice partnership is an effective structure for approaching the work of school improvement systematically and developmentally. Research practice partnerships "are long-term, mutualistic collaborations between practitioners and researchers that are intentionally organized to investigate problems of practice and solutions for improving schools and districts" [14]. We begin by examining the nature of systematic and developmental work. We then provide a description of how a research practice partnership can effectively support the kind of systematic and developmental work that can lead to sustainable improvement for the children and the adults in a school community.

**Systematic School Improvement**

When we use the metaphor of human development to describe a systematic and developmental approach to school improvement, we are struck by the ways in which human beings are the integration of a variety of systems (e.g., circulatory, nervous, digestive, muscular, and skeletal) that each have a function that contributes to the whole person. The human body is a system that comprises these subsystems. For the person to be healthy, each of these systems needs to be healthy and working in concert. A breakdown in one system (e.g., circulatory) affects the whole body. In order to support the optimal functioning of a person, we need to support the optimal functioning of each of the systems that comprise that person. We propose that the same can be said for an effective school. There are systems that comprise the school and in order for the school to function effectively, each of the systems needs to be healthy and working in concert.

culture in which every teacher and every student is met with high expectations and support leads to improved student performance. We know that schools in which the cultural and linguistic heritage of the students in the building are integrated into the learning process has a positive impact on student performance. We know that school districts that have stable leadership over time with thoughtful transitions are best able to create the conditions of sustainable success [10, 11].

What we do not do well is take what we know from research and exemplars of excellent practice and then replicate that success in other contexts in a sustainable manner. One reason for this lack of coherence is the weakly organized relationship between PK-12 schools, institutions that perform educational research, programs that prepare educators for the field, and the civic institutions (e.g., state and federal departments of education) that regulate the practice of education. We are writing this essay in the early phases of the Covid-19 crisis which has significantly disrupted the practice of PK-12 education. The variations in response to this crisis are remarkable.

They range from school districts that have completely shut down to schools that have effectively put their academic, arts, and physical education programs into a virtual learning format with everything in between. The capacity to respond to this disruption is deeply influenced by the wealth, or lack thereof, in each community. The higher density of poverty correlates strongly with the ability of students to gain access to learning opportunities. What is most stunning is the significant lack of coordination across the system [12]. This stands in marked contrast to the medical industry which is also being disrupted by this crisis but is responding with international cooperation to find vaccines and treatment using rigorous scientific methods and communications around clinical experimentations. Even with great loss of life, most countries are implementing evidence-based public health interventions that are serving to reduce infection and create opportunities for treatment and prevention. We support the hypothesis that their success is a function of valuing the role of research throughout the medical industry and using systematic acquired evidence to guide decision making.

In order to close persistent achievement gaps, in order to reach the OECD's 2030 goals [13] in order to implement cultures of continuous improvement within schools that are focused on meeting the needs of all children, we need to develop a well-organized, coherent and cohesive relationship among the groups that are involved in the educational industry (e.g., PK-12 schools, institutions that perform educational research, programs that prepare educators for the field, and civic institutions that regulate the practice of education) that is grounded in an evidence-based process. As the emergency room doctors' decision making is an outgrowth of lab science, so should be the decision-making of the kindergarten teacher. For this level of integration to develop, we need to start with constructing infrastructures that support the development of a culture of evidenced-based practice within PK-12 schools.

It is important to note that we are not suggesting there is not a need for a new organization to fill this role, but a need to restructure existing organizations to make this cooperation feasible and effective. For example, the Institute for Educational Science has developed the What Works Clearinghouse [14] which serves as a system to disseminate information about evidence-based practices across the education industry.

We are suggesting that we need to find a way for existing organizations to co-create a system that allows for a more effective interaction between practice and research, a way to systematically facilitate the implementation of evidenced-based programs into practice.

Research practice partnerships are one such solution. Coburn *et al.*, [4] do an excellent job of articulating how the use of research practice partnerships could be the process through which such a system could be built, and some of the challenges to

building such a system.

They make the argument that schools to not have the time and capacity to perform its own research and that scholars do not have the time and capacity to run a school.

School-based educators may have questions about what is the best way to address the needs of their students, either by demography, discipline, or language, but are dependent on using current practices to guide their decision making. Researchers may have methodological skills that can help educators solve problems of practice, but they also have a particular areas of expertise (e.g., mathematics or literacy education) and/or a particular approach to how to solve problems of practice (e.g., focus on classroom discourse) that may not meet the needs of a particular school. Coburn *et al.*, [4] point out that a way to build more effective collaboration between school-based educators and scholars is through the development of research practice partnerships.

They state that a research-practice partnership has the following 5 characteristics.

They are a) long term, b) focused on problems of practice, c) committed to mutualism (trust), d) use intentional strategies to foster the partnership, and e) produce original analysis. The purpose of such a partnership is to conduct rigorous analysis of efforts to solve problems of practice in such a way that the school based partner has evidence to support the efficacy of their program and that the scholar can publish the results so that others can learn how to replicate their success in other contexts. Core to this structure is that the work is about solving a problem of practice for a teacher, school, or district in such a way that the lessons learned can be used by others to solve their problems of practice. As such, the research is seen as authentic, relevant, and meaningful to the field of practice.

Core to the success of research practice partnerships is that the partners take to the time to articulate their mutual interest, how their strengths can complement each other, and commit to the work that such a partnership demands to be healthy and functional over time and across personnel changes.

Coburn *et al.*, [4] describe three types of research practice partnerships.

One is a research alliance. In a research alliance, an independent research organization contracts with a local educational (LEA) or youth serving (YSA) agency to conduct research (and evaluation) on their efforts to improve practice within the agency.

The focus of the research is collaboratively determined and then conducted by the research organization. The results are developed and presented in such a manner that the LEA or YSA can use them to determine the efficacy of their programming and use the findings to determine which efforts to replicate or to stop. In a research alliance, this evaluation is not independent. It is rigorous, but designed to serve the agency, in the same way research conducted by a corporation is designed to improve their product first, and the industry subsequently.

Another type is design research. A distinguishing characteristic of design research is that it is focused on how the partnership can focus on all phases of program development from a) initial design (e.g., an elementary level social emotional learning program), b) evaluation of initial implementation, c) re-design in response to initial findings, d) evaluation of subsequent implementation and repeat until program is deemed effective, e) taking the intervention to scale across the system and evaluating its impact. The scholar brings their knowledge of the content and evaluation methods, the practitioners brings their understanding of the content, learning science, and pedagogy. The partnership produces interventions that one can have confidence will serve the needs of the students in this context. This is an iterative process that creates the data which can guide decision making.

A third type is network improvement communities. Similar to design research, network improvement communities (NICS) take an iterative design and data driven

approach to problem solving. They use a plan-do-study-act (PDSA) cycle in which the participants in the NIC a) identify a problem of practice, b) plan an intervention to solve that problem, c) put the plan into action, d) collect data about the impact of the plan, and e) use that data to improve the plan before engaging in another PDSA cycle. Part of what allows NICS to be an approach that facilitates continuous improvement is that each PDSA cycle can be used to improve a particular and/or take the learnings from one cycle and bring it into another context in such a manner that systematically adjusts the plan to meet the needs of this new context. In that way, NICS are effective ways to support the replication and scale of effective programming. Another distinguishing characteristic of NICS is that they are consciously focused on systems change. The networked community includes groups from across a given system. For an example, a NIC that was focused in developing an effective civics program that successfully integrate an equity perspective into the work would include participants for several schools, districts, and/or agencies. A NIC could be designed with both LEAs and YSAs who were working on a common problem of practice. A third distinguishing characteristic is the different roles of the practitioners and researcher take on in this structure. In NICS, it is the practitioners who determines what is the relevant data and is the one who does the collection and analysis of the data as it is used for improving the plan. In NICS, the role of the research is more focused on facilitating the PDSA cycle.

Evidence suggests that interventions developed within the context of an RPP positively impacts student learning (Coburn & Penuel, 2016). [When executed well and in a way that incorporates the voices and expertise of practitioners on the ground, RPPs also hold promise for sustaining these interventions over time, as those responsible for implementation feel ownership over it.

## Challenges

Despite the growing popularity of RPPs, particularly among funding agencies [3] we still have much to learn about executing them successfully. Coburn *et al.,* [4] have found the following challenges to the maintenance of research practice partnerships. They are a) bridging the different cultural worlds of researchers and practitioners, b) developing and maintaining trust, c) maintaining mutualism, d) balancing local relevance with scalability, e) balancing immediate district demands while maintaining depth and quality of research, f) aligning partnership work with norms and incentives of research institutions, and g) maintaining the relationship over time with changes in schools, districts, and researcher turnover. These are also the challenges that need to be overcome in order to establish a research practice partnership.

## Conclusions

RPPs hold promise for both translating research on what works into practice and for generating context-specific programs and practices that can be scaled within and across organizations. Because this is a novel approach for many researchers and practitioners, to overcome these challenges in forming and maintaining RPPs, we should treat them like any new intervention aimed to be successfully implemented in schools. For example:

- Build will across stakeholders so all are invested in the relationship and the work;
- Build capacity of practitioners and researchers to collaborate, including building an understanding of what each of their roles are, the technology of the specific type of RPP employed (e.g.*,* the design process, improvement science protocols, etc., etc.);
- Reorganize infrastructure to facilitate partnerships in a way that is meaningful

and sustained (e.g., officially putting partnerships into the title/responsibilities of administrators, allocating existing contracted time for teachers to engage in this work, on the university side rewarding partnerships by including it as part of tenure review or faculty reappointment, etc., etc.).

In order to evolve into an industry that is able to meet the needs of its most vulnerable and prepare all its students to have meaningful careers and be engaged citizens, educational organizations must commit to developing effective working relationships with each that are committed to the principles of continual improvement. We hypothesize that a first step in achieving these goals is to develop and implement research practice partners.

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# Sites of Relevance: Popular Culture and Transformative Education

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## Abstract

*This paper is about the pedagogical force and consequence of popular culture. The materiality of popular culture, its multitudinous artifacts, forms, genres, media and platforms, is secondary here to the more compelling capacities of popular culture to formulate, disseminate, produce, reproduce, negotiate, share and contest meanings. By demand and by necessity, the key, critical, and resonant site of current and emerging pedagogical attention and invention are the experiential dimensions of popular culture. Indeed, the question of popular culture resides at the very core of educational design and development and is an instigation and direction for pedagogical change in the urgent pursuit of relevance in globalizing circumstances and in dynamic digital culture. Popular culture has always been a powerful influence, constitutive experience, and organizing principle in the lives of the young, and never more so than in expansive digital media environments where engagement with popular culture is for the young, ceaseless and foundational. With a comprehensive grasp of the decisive intersections of education and popular culture in the lived experiences of students, educators must be driven to develop and sustain pedagogies that properly attend to the appeals of, and power within popular culture to activate students. This analysis of popular culture is inflected necessarily with Freire's insights and provocations around critical education (concientização). In particular, his arguments for critical acuity in learning to engage with and ultimately challenge and oppose social, political and economic contradictions, motivate educational practices to move beyond knowledge in the abstract to knowledge in action; or stated differently, to desegregate knowledge from social activity. This paper argues for the active and transformational capacities of popular culture in education because first, popular culture is a site of learning, and second, popular culture is a critical means of mobilizing education toward social change. Simply stated, "popular culture" is more verb than noun, a practical action that brings lived experience substantively and consequentially into current and emerging educational priorities and practices.*

## Educating in the Pandemic

If education must be constantly reimagined and revised, and if educational reform in the broadest sense can be understood as the core and driver of social change, then the pandemic has demonstrated that the transformation of education has never been more urgent. This is not simply a case of visioning and implementing the already expansive landscape of technological solutions applied at scale. While the virtues of online learning and teaching-at-scale have been celeritously and comprehensively applied during the pandemic, educational resources and pedagogical imagination are not simply a matter of technological capital or technologically enabled remote mega-classes. Even the strongest advocates for online teaching-at-scale recognize some of the perils. As Steven

Mintz acknowledged, "Teaching at scale is the holy grail of those who hope to cut the cost of higher education." And such scale further offers a means to "maximize revenues while minimizing instructional expenses" for an abundance of online degree and certification programs. (Mintz, 2019) [1] There are well-founded concerns around neoliberal trending in the modern university, managerial models of education policy, administration and practice, and education ordered by metrics set in results-based administration. Such critiques see online mega-classes as enablement and justification for a managerial discipline of educational structures, policies, and curricula.

In the urgencies of educational revision, an understanding of the relationship between popular culture and education demonstrates that we can never dispense with the nuance and richness of synchronous, deeply interactive, participatory and personalized face-to-face pedagogical practices, as well as the compellingly enduring concepts of, and approaches to experiential learning and critical pedagogy. And this is the critical entrée for popular culture into education, or more specifically, the argument for the "practical activity" (Bekerman, 2008) [2] of popular culture where knowledge is not abstract but rather derived from lived experience and active social engagement.

## Popular Culture: Lived Experience and Educational Foundations

In their argument around teaching and learning for "social efficacy", White and Walker situate popular culture in the centre of shifts from transmission to transformational models of education, from standardized, conformity-inducing and disempowering practices of educational delivery to open, malleable, problem-driven and agency-focused pedagogical approaches. (White and Walker, 2008) [3] "Transmission to transformation" in education resonates with James Carey's seminal concept of the "ritual" view or model of communication. (Carey, 1989) [4] In particular, Carey distinguished between the capacities of communication, with "transmission" connoting the sending or transmitting of information over space and "ritual" connoting commonality, a shared and participatory capacity of communication that makes meaning of the cultural world. Indeed, this dichotomy between transmission and ritual brings into focus the significance of transformational education – an infinitely richer and more consequential philosophy and practice than transmission of information – and also illustrates and asserts the import and essentiality of popular culture as an educational site and resource.

There are many tasks at hand with regard to popular culture and education, two of which are most pressing. First, as Koh and Benson have argued, we need to "bridge the alluring world of popular culture consumption to learning in schools". (Koh and Benson) [5] Such a task recognizes that educational strategies, curricular content, and pedagogical practices need to recognize the centrality and the integrity of popular culture as it is experienced by the young. Simply stated, popular culture activates students in education because it is a supremely influential organizing and activating principle in their lives outside school. Second, we need to fully grasp popular culture beyond its materiality, its media and artifacts, and begin to integrate popular culture into educational strategies that recognize the significance and consequences of popular culture as it is "lived" by the young. Popular culture has been long and routinely treated as occasionally instructive detritus and distraction, commercial and consumable, media-based, marketplace-delivered, and elaborator and reinforcer of dominant ideologies. However, following Freire's foundational principle of "critical pedagogy", popular culture takes us from knowledge in the abstract to knowledge in action. (Freire, 1970) [6]

## A Teachable Case: Popular Culture as a Pedagogical Force

The pedagogical value and power of popular culture demands an expansive concept of popular culture that goes beyond consumable things to include events and rituals.

Pedagogies of popular culture involve more than recontextualizing forms, texts, genres and media of popular culture for classroom analysis. It is important to recognize that such pedagogical recontextualizing of media texts and artifacts, can and should be educationally provocative and most assuredly a foundation for classroom debate around resonant and topical subject matter (especially with regard to the dynamism of digital texts, media and literacies). However, there are critical lessons in moving pedagogy into the realm of the public events and public action. The pedagogical practice of recontextualizing popular culture certainly advances the achievement of analytical acuity; and proposing an idea of popular culture as public events and rituals decisively mobilizes education for the objective of social action and social change.

A teachable case of popular culture of impact and power is a global moment of popular expression, a ritual catharsis against confinement, anxiety, and fear. A ritual that began throughout western European cities of Rome, Paris, Madrid, Athens, Amsterdam, and others during the pandemic has become global, and has come to include my city of Vancouver. This ritual of course, is the singing, cheering and applauding for the besieged and exhausted healthcare workers on the frontlines against COVID-19, and for the essential service workers showing up daily and nightly for their jobs in precarious circumstances. In Vancouver, the event begins at 7:00 PM every evening, the moment of the shift-change of healthcare workers and first responders. One could and should interpret this ritual in terms of the ameliorative capacities of popular culture in calamitous times. The neighbourhood of the West End is the most densely populated urban core in Canada, and so the ritual is particularly cacophonous among this critical mass of humanity. The moment is as much a full-throated cathartic release, a shout for social connection, a momentary purging of frustration, isolation, and claustrophobia as it is a loud and forceful cheer the fortitude of healthcare workers, research scientists, first responders, grocery clerks, delivery drivers, everyone outside and not inside by necessity, duty, and dedication. As David Remnick characterized the similar ritual in New York City as, "Joy comes at seven." [Remnick, 2020) [7] Shouting, clapping, banging pots and pans, blowing trumpets and vuvuzela, the setting off of fireworks, and more, the people of the West End open their windows or step out on their balconies and let loose with a life-affirming declaration into the night sky.

The capacity of popular culture to serve as a form of "public pedagogy" (see Ellsworth, 2005; Giroux, 2000; Sandlin, Schultz, Burdick, 2010; Silberman-Keller, *et al.*, 2008) [8], [9], [10], [11] toward social change and community cohesion and assertion is forcefully evinced in this event/ritual. Of course, the expansive concept of "public pedagogy" defies quick summary, but its analytical premise concerns the sites, forms, and processes of learning outside of traditional educational institutions. As such, public pedagogy embraces public spaces and institutions beyond school, digital communication sites, and media; it can assume activist and counterhegemonic significance in pedagogical public places distinct from places of formal education; and it understands education and its institutions as "fluid, open systems that are themselves nested within multiple, overlapping, and contested sites of learning."(O'Malley, 2010) [12] Theories of public pedagogy from a wide range of disciplines has extended and elaborated the very notion of pedagogy to emphasize the educational value and significance of affect and experience over rational and curriculum-disciplined learning, and to challenge the regard for the traditional educational institution as the sole or single most authoritative site of educational activity.

## Across the Divide: A Concluding Note

This last point has been particularly critical in school closures across the globe during the pandemic. Governments, educators and their institutions, and parents have struggled mightily to get university students to the finish line or to deliver lessons plans for home schooling for distracted and disinclined children. As the traditional educational institution and its dominant and enduring practices of narrowing programmatic content and delivery have been necessarily compromised, if not eroded, the open, affective and experiential dimensions of popular culture remain critical and enormously productive pedagogical resources.

Learning occurs in diverse sites, and by formal and informal modalities. The intersections between the sites of education and popular culture, between learning the acuities of abstract and analytical knowledge and learning toward social action through "lived", experiential and practical knowledge are mutually informing and inextricably connected. In pedagogical terms, learning in "public" and learning in "institutions" must be bridged by researchers, educators, policy-setting administrators, and curricular designers and developers. The educational stakes are high in the recognition of popular culture as a site of relevance in educational contexts, especially as those traditional contexts are less than stable and not at all immutable in current circumstances.

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# Spontaneous Cooperation between Children in Automata Construction Workshops

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## Abstract

*This paper describes the Automata for STEM Erasmus+ project, its aims and activities, in particularly spontaneous cooperation between children while participating in automata construction workshops. Taking as a starting point the need to motivate students in the areas of science and mathematics at an early age and also the characteristics of automata, involving two parts, a narrative and a mechanism, the Automata for STEM project aims to explore automata as a strategy to plan and implement contextualized and interdisciplinary activities which involve reference to science concepts or phenomena. The present work focuses on the analysis of spontaneous cooperation between children who participate in four project's workshops. The pedagogical general method followed in all the workshops involved the presentation of automata, children being challenged to plan and construct their own automata, with no cooperative learning structure imposed. Data were gathered through participant observation, registering field notes, photos and videos. Based on the content analysis, categories and subcategories of spontaneous cooperation were identified. In summary, data analysis pointed that despite the characteristics of cooperative work were not formal established, spontaneous cooperation between children emerged. This spontaneous cooperation can take different features, namely, to decide to work on the same automata or to develop their own automata while cooperating in informal way with colleagues. In this case, cooperation can be seen in dimensions as observing each other work, sharing materials, to help with the construction, to imitate and being inspired by the colleagues' work. Spontaneous cooperation also varied according the children age, the context, structure and organization of the workshop, e.g. the seating arrangement. The mechanism used seems not associated with the characteristics of the cooperation.*

*Keywords: Automata construction, spontaneous cooperation, children, STEM*

## 1. Introduction

Taking as a starting point the need to motivate students in the areas of science and mathematics at an early age, the Automata for STEM project aims to explore the use of automata (moving toys) as a strategy to plan and implement contextualized and

interdisciplinary activities in STEM [1].

Automata are mechanical toys, constituted by two fundamental parts: on the one hand, a figure, or a set of figures that can represent an idea or narrative; on the other hand, a mechanism allowing the movement of the figure(s). An automaton might be seen as a syncretism between engineering, cultural awareness and artistic expression. A pedagogical approach to use automata in class can be based on the combination of narratives and mechanical movement toys, using science stories suitable for young children. Automata can be built to represent characters or scenes in the story. Stories that include Automata can introduce elementary mathematics, geometry, engineering and physics, geology and other science contents while enhancing other abilities and attitudes with very affordable equipment made solely of recycled materials. The characteristics of the automata, namely the fact that they have a narrative part and a mechanism, allow, in a playful approach, to implement activities related to the planning and construction of those toys and to enhance skills such as observation, problem solving and cooperation.

Since one of the transversal competences that is intended to be developed with the activities of the project consists of cooperation, although cooperative learning strategies have not been introduced, we tried to observe how spontaneous cooperation forms emerge, which can be suggested by the dynamics of the activity proposed, the habitus, culture and classroom arrangement, age of the children and attitude of the educators.

Cooperation is a form of interaction between two or more individuals. What distinguishes cooperation from other forms of interaction is the fact that it takes place according to an objective common to these two or more individuals. In this way, cooperation emerges as a way to achieve a goal that individually could not be achieved [2]. Indeed, cooperative learning is now advocated as a form of high-impact instruction [3], which refers to various strategies used in the classroom, designed to create active learning and involvement among students. These strategies are based on principles and procedures, which are different from ordinary group work, constituting an alternative to competitive and individualistic structures, contributing to better cognitive learning and the development of social skills, assuming different structures and syntaxes, which individualize them (jigsaw, cooperative scripting, learning together, group investigation).

Hargreaves [4], a defender of these strategies, considers that these should be included in the repertoire of teachers, and should be used with flexibility and discretion, recognizing that their introduction in schools and classrooms constitutes a safe simulation of the forms of collaboration more spontaneous that are possible among students, which have been somehow eradicated by the school and teachers, through discipline control and assessment practices. These forms of spontaneous cooperation are of great value and unpredictability and the locus of control of cooperation is in the student.

One of the components of cooperative learning consists of positive interdependence, which assumes several modalities, namely, interdependence of purposes, when group members work towards a common purpose, of task, when "two hands are not enough", of resources, (scissors, paper, glue, etc.), and the environment/space where the group works, which can become an unifying element [5]. It is in this sense that we consider that these forms of interdependence can be observed in the realization of the workshops, among others, without having been instructed for this type of learning. So, the objective of this study is to identify spontaneous forms of cooperation among children who participated in the toy construction workshops that move.

## 2. Method

The present work focuses on the analysis of spontaneous cooperation between children who participate in AuotSTEM project's workshops.

### 2.1 Corpus

Four workshops were considered, with approx. 20 children each, from six to nine years old.

Workshop 1 and Workshop 2 had a very similar structure – in each one was present 22 students of the 2nd grade of a Basic School with ages between 6 and 7 years. The sessions lasted two hours. In these sessions was presented the rotation mechanism with different narrative parts.

Workshop 3 took place in class, 24 children, first grade, 6 years old. Linkages and lever automata were presented and each child built two automata. The session lasted three hours.

Workshop 4 had two sessions, three hours in total, with 21 children, the first, and 19 children, the second, ages between 9 and 10 years. In this workshop were presented different automata as the one with the rotation mechanism, with the lever, the linkages.

### 2.2 Pedagogical Approach

The pedagogical general method followed in all the workshops involved the presentation of automata and children being challenged to plan and construct their own automata.

However, there were some differences in the workshops: in three of them, a poem about the earth was presented, one of the workshops took place in the library, while the others occurred in class. with children seating in pairs or in large classroom arrangement.

There were different class arrangements: in pairs, in round tables, presentation format. Teachers scaffolded the process, however in the library workshop there was a minimum of instructions, while in the classroom workshop several instructions were presented. The class teacher as not present in the library workshop. From the instructions about how to construct the mechanism to the final product, several processes took place, namely spontaneous cooperation between children emerged.

### 2.3 Data Analysis

Data were gathered through participant observation, registering field notes, photos and videos. A report for each workshop was elaborated. Data were analysed through content analysis.

## 3. Results

Content analysis of different types of data identified categories, subcategories and indicators of spontaneous cooperation and pointed to different features spontaneous cooperation can take. Results are presented in Table 1.

*Table 1. Categories and subcategories for spontaneous cooperation during AutoSTEM workshops*

| Categories | Subcategories | Indicators |
|---|---|---|
| General characteristics | Working modality | Each child develops their own prototype while cooperating in informal way with colleagues |
| | | Children spontaneously decided to cooperate and build a group automaton |
| Dimensions of spontaneous cooperation | Transversal to both working modality | Informal distribution of tasks |
| | | Sharing materials |
| | | Observing each other work |
| | | To help with the construction |
| | While working on the same project | Interdependence of purposes |
| | | Coordinating actions |
| | | Shared tasks |
| | | All ideas are considered and included in the automaton |
| | While working on separate projects | To imitate and being inspired by the colleagues' work. |
| | | Selfless willingness to help a colleague |
| Influencing factors | Children age | 6-7 years old – cooperate while developed their own project |
| | | 9 years old – decide to working on the same project |
| | Teacher guidance | More guidance – children cooperate while developed their own project |
| | | Less guidance – children decide to work on the same project |
| | Seating arrangement | Pairs or presentation – children cooperate while developed their own project |
| | | Round tables – children decide to work on the same project |
| | The presence or not of their everyday teacher | Teacher presence – children cooperate while developed their own project |
| | | Teacher is not present – children decide to work on the same project |
| Impact | Work developed | When working on the same project, the automata produced is more complex |
| | Creativity | When working on the same project, the automata produced include differences from the automata initially presented |
| | Positive emotions | Expressions of satisfaction and joy when presenting the automata developed together |

In summary, results pointed that despite the characteristics of cooperative work were not formal established, spontaneous cooperation between children emerged. This spontaneous cooperation can take different features, namely to decide to work on the same prototype or to develop their own prototype while cooperating in informal way with

colleagues. Spontaneous cooperation appears to respond to the difficulties experienced by children both individually and in groups. What is often seen is an altruistic attitude in helping the other to solve the problems he encountered in the construction of his automata. Often there is also spontaneous cooperation in sharing ideas and materials that leads to group work to build a group automaton or to build their own individual automata. Some dimensions of spontaneous cooperation are transversal to both work modalities while others are specific of each one of them.

Spontaneous cooperation also varied according the children age, the context, structure and organization of the workshop, e.g. the seating arrangement. The mechanism used seems not associated with the characteristics of the cooperation.

## 4. Discussion

Within the scope of the AutoSTEM project, the cooperation that arises is what was then called spontaneous cooperation. The activities developed by the project are not directed to group work, however, and given its free character, situations of cooperation among students arise several times due to numerous factors. This cooperation falls under the category of informal and spontaneous since the educators never ask for children to work together but they still do, and it contributes to the success of the task.

The spontaneous cooperation between children that emerged during AutoSTEM workshops shapes Hargreaves' proposal [4] to use cooperation with flexibility and discretion and to promote more spontaneous forms of collaboration. The pedagogical approach used on AutoSTEM workshops allowed the emergence of different dimensions of cooperation. These different dimensions of cooperation identified also showed that children's spontaneous cooperation emerged in a continuum that goes from what is considered cooperative learning, strictly, when children decide to work on the same project, for what is considered collaboration, when children cooperate, but each developed their own project. The results also point to the multiple factors that can influence spontaneous cooperation and its positive impact on the work developed, on creativity and well-being, skills communication and involvement.

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# Studies on Language Learning

# Challenges and Opportunities of Croatian EFL Teachers' Continuous Professional Development for Intercultural Dialogue

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## Abstract

*With the growing emphasis on the need for an intercultural approach to modern education [1, 2] and the pedagogy of intercultural competence [3], twenty-first century EFL teachers are no longer expected to merely transmit factual information about the target culture; they have assumed the role of a cultural facilitator or mediator through the learning process [4]. This comes as no surprise given that language is an inseparable part of culture. In the Republic of Croatia, [5] presumes a high level of teacher competences and their ability to effectively utilize a range of methods and teaching aids in order to successfully organize the educational process. However, while the need to implement the fundamental tenets of intercultural education across subject curricula and the emphasis on the role of teachers have become the focus of much scholarly effort [6, 7, 8, 9], teachers would benefit from additional encouragement in fostering both their own and their students' intercultural competences. Therefore, this paper aims to provide an insight into the challenges of intercultural education and opportunities of continuous professional development of EFL teachers that encourage a positive classroom atmosphere and facilitate risk-taking, self-reflexion, and development of respect for cultural differences as well as an open and constructive intercultural dialogue.*

*Keywords: intercultural education, teachers' professional development, foreign language, pluralism*

## 1. Introduction

While language proficiency lies at the heart of any language instruction, it has been recognized that "learners need not just knowledge and skill in the grammar of a language but also the ability to use the language in socially and culturally appropriate ways" [1, p. 7]. This means that, in the 21st century classroom, teachers of English as a foreign language (EFL) are no longer expected to merely transmit factual information about the target culture, but rather assume the role of facilitators [4] that encourage students' activity and motivation while they explore, analyse, and evaluate received information through authentic materials and more eagerly engage in intercultural dialogue. EFL teachers are thereby required to navigate between cultures in a manner that accurately represents both the source and target culture, while simultaneously modelling intercultural values and interpersonal skills that foster a democratic and open dialogue.

Affirmation of intercultural dialogue implies a culturally responsive teaching style, encouragement of student participation in intercultural experiences and exchanges, and promoting partnerships and cooperative learning methods [10]. While it may be argued

that EFL teaching and learning is in and of itself intercultural, the kind of intercultural competence that is an expected outcome of exposure to intercultural education does not happen spontaneously without effort; it is a learning process that presupposes continuity.

Furthermore, achieving a uniform degree of teacher competence for intercultural education has proven challenging. While for some teachers, intercultural education and competence are central to their educational concerns and planning [3], research suggests that teachers devote more time to language teaching than culture teaching [11]. For this reason, it is essential that EFL teachers, who are the liaison between the fundamental values of intercultural education and the students, be provided with the required competences during initial education as well as regularly supported through continuous professional development programs that are "critical to systematic educational reform and school improvement focused on enhancing learning outcomes for all children in public education" [12, p. 64].

## 2. Theoretical Background

The development of intercultural education in the European context is associated with migrations following World War II and the development of integration policies and recommendations of the Council of Europe and the bodies of the European Union.

Formal education was thereby given a key role in providing the appropriate environment for fostering intercultural communication and dialogue [13, 14]. With the growing emphasis on the need for an intercultural approach to education [1, 2] and development of intercultural competence through education [3, 15], the linking of language and culture in the FL classroom has become the focus of much scholarly inquiry [16]. This comes as no surprise given that language and culture are inextricably linked. Cuture is a complex concept that incorporates 'material' manifestations of culture that are easily seen and 'non-material' ones that are more difficult to observe [17]. In this paper, culture is understood as "culturally-influenced *beliefs* and *perceptions*, especially as expressed through *language*, but also through cultural behaviours that affect cross-cultural tolerance" [18, p. 9, emphasis added]. However, in order for EFL teachers to be able to conduct intercultural education, i.e., to encourage students to form intercultural attitudes and to educate them for intercultural communication and dialogue, it is necessary that they themselves are interculturally competent [19].

The term "intercultural competence" may be defined as the ability to interact in one's own language with the people from another country and culture [1], whereby the term comprises knowledge, skills and attitudes, complemented by the values one holds because of one's belonging to a number of social groups [4]. Byram went a step further and proposed another term relevant for FL instruction, "intercultural communicative competence" (ICC), which he views as the ability to interact with people from another country and culture in a foreign language. Surely, the development of attitudes towards people from other cultures is not the sole responsibility of the school; it is inevitably influenced by various factors such as family discourse, representation of minority groups in the media, and personal contact with cultural diversity. In formal education, the responsibility for developing intercultural competence in learners is shared by all teachers; however, to differing degrees [3]. Therefore, before EFL teachers can be expected to deliver on the great expectations of intercultural education, they need to be empowered and equipped with the necessary knowledge and skills to ensure inclusion and equity in education. This requires looking beyond the conscious elements of the target culture (food, literature, history, geography) and exploring unconscious ones (beliefs, values) through authentic resources (digital, interactive content) and representations of cultures as well as concrete vocabulary that promotes human rights

and equality. The development of intercultural competence through education encourages teachers to work with the knowledge and experience each student brings into the classroom [20], yet it is equally important how teachers contribute to cultural encounters within the classroom because they, too, draw on personal and professional experiences, explicit knowledge, beliefs, and ideas [21].

The implementation of intercultural education in the everyday teaching practice across subject curricula has become the focus of much scholarly effort in the Republic of Croatia. We know from research that "teacher beliefs directly influence the interpretation and importance which they attribute to their teaching experience" [22, p. 135]. Some Croatian authors have given a significant contribution to defining the fundamental dimensions of intercultural competence [23, 8, 7, 24, 25, 26, 6]. However, there is a lack of research on in-service EFL teachers' interpretation and implementation of ICC as well as attitudes and beliefs about intercultural education, especially considering that research into the intercultural content provided in programs of study for the education of English language teachers reveals that the majority of programs do not contain content related to the components for developing intercultural competence [27].

Therefore, given that the acquisition of communicative competence precedes the acquisition of ICC, it is justified to wonder how much emphasis is placed on intercultural content during classroom teaching. While it is important to continuously explore what aspects of intercultural teaching EFL teachers are already addressing in their teaching practice, it is equally important to uncover what it is that they are not because "teachers cannot teach and cannot increase awareness of something they do not know themselves" [28, p. 70]. Programs of teachers' professional development with intercultural orientation have the potential to uncover EFL teachers' strengths and weaknesses and provide them with opportunities to apply techniques that promote self-reflection and greater self-awareness both in their students and themselves.

## 3. National Curricula and EFL Teachers' Continuous Professional Development

In the Republic of Croatia, [5] has adopted the EU guidelines on lifelong education and presumes a high level of teacher competences for a successful organization of the intercultural learning and teaching process. The acquisition of multilingual and intercultural competence is thereby perceived as a means of encouraging respect for diversity and tolerance. EFL teachers' role in fostering ICC is specifically addressed in [29], where ICC represents one of the three key pillars of instruction. As one of the values and principles of the subject curriculum, the document highlights that "mastery of the English language outside of school and application of what has been learned in real life situations is encouraged, which opens up opportunities for authentic communication in English in learning and teaching" [29]. The educational process thereby takes place "in a stimulating and safe environment in which each student has the opportunity to succeed, and it is especially important to promote cooperation, encourage creativity and respect for cultural diversity." It is obvious that the demands on EFL teachers are multifaceted and complex. In addition to taking into account the individual development of their students and the successful management of learning processes in the classroom, they are also faced with challenges that emerge from teaching *in* multicultural classrooms or at least from teaching *for* multicultural belonging. This endeavour inevitably requires professional support.

As the name itself suggests, continuous professional development is "a process, not a one-time event or sequence of events" [9, p. 133]. In Croatia, the Education and Teacher Training Agency is the public institution tasked, among other things, with providing teachers with professional and advisory assistance as well as monitoring,

improving, and developing education. Bearing in mind the importance of the Agency's role in the complex and demanding task of designing and managing professional development programs, one can observe the insufficient offer of continuous professional development programs with intercultural orientation intended for EFL teachers. Despite a number of factors that directly or indirectly affect the organization and implementation of professional development, it would be crucial to overcome the existing constraints and meet the challenges of both quantity and quality of designed professional development programs for EFL teachers related to intercultural topics arising from today's school and educational needs. [30] found that Croatian EFL teachers lack the awareness of the key importance of fostering ICC; teachers consider less important the learners' ability to handle and resolve intercultural conflicts and identify cultural stereotypes and prejudices.

A reason might lie in the fact that in-service teachers report that their initial teacher education does not sufficiently prepare them for culture teaching [31]. In the absence of professional development programs that accompany curricular demands and without a clear understanding of EFL teachers' ICC needs and continuous monitoring of their intercultural performance, we cannot confidently state whether Croatian EFL teachers are preparing their students to become effective intercultural communicators. Such research is much needed because if students are expected to acquire ICC, it is essential that teachers be equipped with these same competences as well. Given the aforementioned, there seems to be a disconnect between the research findings and the appropriate institutional response to them. It is, therefore, of utmost importance that teachers have the opportunity to participate in ICC programs. Such programs could target the identified needs and provide in-service EFL teachers with necessary professional support that would allow them greater autonomy and confidence in making independent decisions related to the implementation of the key tenets of intercultural education.

## 4. From Challenges to Opportunities

Integration of interculturality in the EFL curriculum calls for the creation of the necessary conditions to achieve an open and transformative dialogue in which both the teacher and students participate in each other's growth as well as an encouragement of education for pluralism and pluralism in education, which, among other things, promotes intercultural values and principles and the realization of intercultural dialogue. An emphasis should thereby be placed on a critical examination of beliefs and teaching/learning approaches, the transformative character of intercultural education as it challenges teachers' and students' explicit and implicit ideologies, as well as on providing them with the required tools for critical thinking and self-reflection. Through guided support, EFL teachers could increase their sensitivity for intercultural content and become more receptive to a critical evaluation of textbooks and teaching aids given that these are not always selected based on their objective pedagogical value or adherence to national curricula but, among other things, the teachers' intuition and belief in their value [32]. EFL textbooks carry explicit and implicit cultural values referred to as the "hidden curriculum" [33]; therefore, ICC programs might help facilitate the detection of ethnocentric images, stereotypical language or prejudiced portrayal of certain ethnic groups or even their complete omission from teaching content. EFL teachers could be empowered to explore their students' ICC through creative writing tasks, country presentations, critical analysis of media coverage, translanguaging projects, as well as provided with assistance in correcting their students' implicit cultural biases through individual and group feedback. By detecting possible obstacles to the acquisition of ICC, EFL teachers might be able to better visualize the course and dynamics of future

activities that would facilitate the intercultural learning process. Teachers should also be given concrete examples how to include in their teaching practice vocabulary that helps learners to talk about human rights, equality, gender, bias, prejudices and stereotypes [34]. It is thereby important that programs of continuous professional development, including programs of initial teacher education, do not lose sight of the fact that the purpose of EFL instruction is not to prepare the students for successful communication solely in Western English-speaking countries, but also in non-Western contexts. English, as a *lingua franca*, is also used as the language of communication between non-native speakers of English, whereby interlocutors are inevitably included in the interpretation of a third culture, which calls for reconsidering of whose culture is addressed in EFL instruction.

## 5. Conclusion

In the 21st century classroom, students' attitudes and beliefs should be challenged and carefully guided in the direction of the acquisition of ICC. Therefore, the exploration of EFL teachers' ICC needs to look beyond their subjective self-assessments and instead more closely examine their ICC in practice. Given the lack of research on EFL teachers' ICC, we must acknowledge the possibility of a gap between what EFL teachers hope they are doing and what they are actually doing in their teaching practice, not necessarily because they lack ICC but because they require refinement. Precisely for this reason, teachers' responsibility lies in their deliberate, conscious educational action that encourages the development of interculturally competent students-members of a multicultural society, who successfully participate in intercultural dialogue. In this dynamic process of achieving educational goals and expected learning outcomes, the active role of both the students and teachers is assumed. Namely, it is not enough to only learn a language; it is necessary for students to know its application in their familiar environment and the broader society and life. Continuous professional development should assist them in detecting and deconstructing their own potential biases and misconceptions which impact their learning and teaching process and are at odds with the fundamental tenets of intercultural education.

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# Creation of Relevant Edutainment Scenarios for Language Performance through Learning Games

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## Abstract

*Our paper focuses on the design and development of an edutainment scenario as part of a didactic system for the use of Spanish as a second language in a French context. On the one hand, the combination of the issues of Language Didactics, Computer Science, Linguistics and Natural Language Processing (NLP) could offer solutions and operational systems to language learners. And on the other, serious games have the potential to provide serious content in a playful way. Therefore, we have proposed a teaching system capable of integrating the potential of a serious game in order to offer a relevant solution to language learners. For this purpose, our system has been designed and developed according to the language needs of the learners. We have chosen automatic dictation as a pedagogical activity to encourage learners to use language skills in our serious game. Our system also seeks to provide automatic correction elements as a feedback. The continuation of our project consists of completing and testing our first edutainment scenario for the use of Spanish as a second language in order to assess its relevance through an interactionist approach to foreign language learning.*

*Keywords: Didactic System, Serious Games, Edutainment Scenario, Dictation, Feedback, ICALL*

## 1. Introduction

Over the past few decades, teachers and learners have gradually replaced paper-based learning materials with digitized and automated resources. This has transformed the way we teach and learn [1]. As a result, language didactics, computer science, linguistics and Natural Language Processing (NLP) are coming together to provide language learners with operational solutions. These systems are capable of offering a didactic added value compared to conventional systems [2]. Such didactic systems can integrate the potential of serious games [3] in order to offer a solution to the language learners needs. This oxymoron (serious game) has the potential to provide serious content in a playful way [4], [5], [6]. Thus, this issue is at the crossroads of two domains; Digital Game Based Language Learning (DGBLL) and Intelligent Computer Assisted Language Learning (ICALL). The use of video games for language learning has been the subject of several research studies such as; W. Lewis Johnson (2005); Chen & Yang, (2013); Agudo *et al.*, (2015); Huang, Yong-Ming (2015); Van Rosmalen, *et al.*, (2013); L. Schmoll (2016); M. Loiseau (2016), Y. Alyaz *et al.*, (2017) to name but a few. Thus, our main goal in this work is to propose a didactic system that is relevant to the language needs of the learner. We therefore propose the design and development of a didactic system that integrates a serious game, second foreign language dictation/transcription and automatic correction adapted to the learners. In this way, our project focuses on the pedagogical and technical design of a learning system; research and development [7].

## 2. The Edutainment Scenario Model

Firstly, we are interested in the edutainment scenario [8] conceived as a stage of language performance and restitution of language knowledge, based on video games in alternate reality. Such a scenario is based on a first stage of preparation time that would begin with a series of class sessions outside the technical system allowing the preparation of the tasks necessary for language and playful understanding (framed scenario), and a second stage taking place in immersion with the technical system (framing scenario). Our choice to adopt this model is justified, on the one hand, because we consider the time of use of the serious game as a stage of language performance and restitution of knowledge and, on the other hand, because we seek to include the teacher as a guide, before, during and after the use of the technical system (serious game). Secondly, we are interested in dictation/transcription as a positive method for training linguistic skills [9]. Dictation/transcription as learning and training activities are not new; but what could be new to the considerations in this implementation is the combination with a serious game [10]. Third, we are interested in the potential of the direct, immediate feedback to help the learner identify and correct the error himself [6], [11]. Instead of giving a binary response (correct or incorrect), it may be more interesting to show the learner the right word as feedback. Feedback in ICALL system offers students learning at their own pace and cause less frustration [12].

## 3. Proposition

We proposed a first edutainment scenario adapted to the language needs (listening comprehension and written expression) of Spanish as a second language. For this, we have aimed at dictation/transcription as a pedagogical positive method. The project targets students of cycle 4 of a French public secondary school, in the third class (13 and 14 years old). The learners are between level A1 and A2 of the CEFRL, in line with the French National Education Curriculum (2018). Regarding the theme to be dealt with, we have chosen the notion "Meeting with other cultures" of the same Curriculum. For the environment, we personally proposed the recreation of the Chiribiquete Natural Park of Colombia in 3D. In this way, we want to encourage the learner to virtually discover notions of the natural, cultural, geographical and historical diversity of the Spanish-speaking world.

### 3.1 Design Method

We considered that the design of our edutainment scenario needed to follow the steps of the PLOT model (Public, Playful, Learning Objectives and Task) [8] since all the steps are in dialogue and therefore all are iterative. Therefore, we defined the pubic language needs, the dialogues, the story, and the different elements of the gameplay, the specific language targets and the tasks, all these steps being iterative. Thus, we have developed the framing scenario and the framed scenario of our system. For the framing scenario, five class preparation sessions were planned, and for the framed scenario (the serious game), one immersion session was defined.

### 3.2 Technical Choice

We proposed a 3D exploration game programmed by Unity (a game development platform, compatible with C# and C++ language). We suggested a first-person shooter (FPS) in order to offer more field visibility. The gamer is going to be accompanied by an adjuvant player (Non-Player Character) NPC in order to offer the conditions for language situated interaction. The NPC will serve as a language speaker guide (instructions,

comments, information and suggestions). In that way, player performs the right action (listening comprehension) and writes the right text (writing expression) in order to complete the game. Regarding the structure of the scenario, we have opted for a nested event [13] that allow the subject to choose which area he will explore first and thus the corresponding task. See figure 1. The player can thus, more or less, decide the order in which he will complete the tasks, as shown in Figure 1. For example, in Zone 1, the subject is free to move back and forth between the different areas (Zone 1, 2, 3) of the game Scène. However, the language tasks (T2, T5 and T8) and playful tasks (T1, T3, T4, T6, T7 and T9) are sequenced as the black arrows show (T1, T3 and T2) in order to accomplish each area tasks.

*Fig. 6. Structure of the nested scenario*
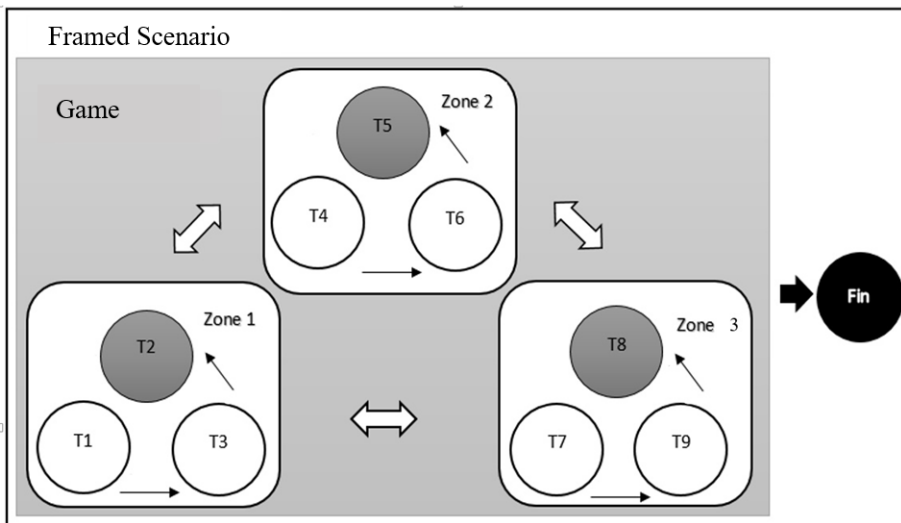


### 3.3 Tasks

The main mission of the game is to make an inventory of species (plants, animals and rupestrian art) in a virtual logbook. On the one hand, the player must explore the terrain and perform actions such as searching for species, freeing the animals T1, taking photos T3 (playful tasks), and on the other, listening (language task; listening comprehension) and writing down the characteristics of the species (language task; writing expression) T2.

### 3.4 Dialogue Structure

The structure of the dialogues is still based on the Boolean type. However, it does not start from an instruction or a question formulated by the NPC, but from an event triggered by the player who initiates an interaction. As a result, the dialog structure takes the form of a condition tree that offers multiple branches with parallel states. Thus, in Area 2, if (condition) the player takes a picture of the monkey then (action) the NPC says: "*Es un tití. Se trata de un mono de barba roja en peligro de extinción*" (It's a marmoset. It's an endangered red bearded monkey). Therefore, if the player writes in his logbook: "*Se trata de un mono de barba roja en peligro de extinción*" then the NPC says, "*Muy bien. Lo has escrito correctamente*" (Very good. You wrote it correctly).

### 3.5 Automatic Feedback

We want to help the learner identify and correct the error himself through automated feedback. Thus, any mistyped words (spelling or grammar) will be automatically underlined and the correct word will be displayed so that the learner can rewrite it. The idea is to suggest the good word to a possibly mistyped word. As an example, in the same Zone 2, if the player writes in his logbook: "*Se trata de un mono de barba roja en peligro de extinction*" (*extincion* without the graphic accent), then the system will be able to suggest the correct word "*extinción*" by clicking on the underlined word and thus give him the possibility to rewrite it correctly.

## 4. Experimentation Method

Once our first test is carried out, we would like to adopt the triangulation mixed method combining a quantitative and a qualitative approach [14]. This, in order to answer this first research question; How could our didactic system provide operational solutions to the needs of language learners? The analysis will concern the experimentation of a new system (pedagogical objective) and the discussion about it (research objective). We planned to collect and analyse quantitative and qualitative data and then compare the results in order to develop a complete understanding.

## 5. Perspectives

The continuation of our project consists of completing and testing our first edutainment scenario. Concerning the evaluation, we wish to adopt an interactionist approach to foreign language learning, which would focus on five criteria: language learning potential, adaptation to the learner, focus on meaning, impact, authenticity and practicality [15]. Finally, depending on the results we would like to suggest its extension to other learner's needs and to other foreign languages.

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# Digital Language Learning Challenges in the Context of Inclusion

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## Abstract

*The increasing alterations in the social structure of the modern European societies due to the migratory flows that arise as a consequence of the destabilization of the political and economic systems from the West to the East are currently creating new forms of multi-faceted cultural and ethnic identities, as well as new forms of migration. Hence, the latest developments have led de facto to the creation of multicultural and multilingual conditions within European contexts. This research proceeds to summarise the main findings, citing general trends in the landscape of FDLL (free digital language learning) initiatives for migrants/refugees. This includes citing and describing key features of FDLL initiatives that were noted particularly for their role in determining the efficiency and/or effectiveness for migrant/refugee inclusion and integration. These features ranged from specific language and culture related models of FDLL initiatives to the extent to which they focus on recognition of learning and on communication and outreach to target groups. The research characterizes current FDLL initiatives by their approaches, including type of design (purely online resource, for example).*

*Keywords: Language learning, free digital language learning tools, inclusion, migration*

## Introduction

According to research findings, more than 50% of Europeans are either bilingual or live in an environment where they are confronted with two or more languages, especially people living in border regions, migrants and people whose parents speak a language other than the national language. Language acquisition and language enhancement gets more and more important for an intercultural dialogue in our society and for increasing job chances of individuals. Besides, from the perspective of migrants, the majority of sociological and linguistic studies indicate the necessity of learning a local language, in order for the smooth integration of the migrant into the new social context to be ensured.

The innovative character of the project 'From Alienation to Inclusion' lies on the activities related to a unique on-line environment which contains comprehensive training modules on social integration of migrants and refugees into EU societies, while seeking to eliminate all those social, linguistic and psychological barriers which prevent migrants and refugees from being integrated in the new environment [1].

Given that many researches indicate that digital learning is useful for migrants and refugees, the paper aims to analyse the free digital language learning (FDLL) tools specifically related to language learning as a means for the inclusion of migrants and refugees in Europe.

De Waard [2], Mason and Buchman [3], Moser-Mercer [4] indicated that FDLL tools should:
  1)  have clear objectives and a clear target audience,

2)  be defined taking into account the needs of this target audience, including its skills, learning environment, learning needs, fragility and cultural context, and

3)  collect data about effectiveness of the FDLL to meet its objectives and address the needs.

This research summarises the main findings, presenting general trends in the landscape of FDLL initiatives for migrants/refugees. This includes citing and describing key features of FDLL initiatives that were noted particularly for their role in determining the efficiency and/or effectiveness for migrant/refugee inclusion and integration. These features of the tools concentrate on specific language and culture related models of FDLL initiatives as well as on recognition of learning and on communication and outreach to target groups. The research characterizes current FDLL initiatives by their approaches, including type of design (purely online resource, for example).

Knowledge of the host country's language is crucial for migrants' and refugee's integration. In this paper we argue that today migrants' and refugees' integration require the acquisition of communication skills that have three important and increasingly indistinguishable dimensions: language skills, ICT skills and functional skills which are needed in everyday life in our society [5].

The methodology for the research included a literature review, a presentation of relevant initiatives featured in searchable websites and an analysis based on the content of the different profiles.

The classification of the collected FDLL tools is based on the qualitative content analysis.

## 1. Results

The total number of the FDLL tools investigated in the research consists of 32 learning cases. The classification of FDLL tools is based on the language teaching approaches. Overall, 11 language teaching approaches have been identified.

In this section we classify only the most relevant language teaching approaches used in free digital language learning tools. Each language resource (FDLL) is classified according to the basic characteristics: 1) title, 2) publisher, 3) target language(s), 4) target group, 5) description, 6) methodology [6].

### 1.1 FDLL Tools Invoked by Audio Lingual Approach

PHASE 6 HALLO GERMAN CHILDREN. Methodology: Audio-lingual approach. The user can select a specific topic (*ex*. at school, my hobbies) and has to listen and repeat expressions and sentences in German. Thus, the users learn vocabulary, constructing sentences, and, indirectly, a little grammar. EINSTIEG DEUTSCH. Audio-lingual approach. The user can select a specific topic (*ex*. at school, my hobbies) and has to listen and repeat expressions and sentences in German. Lexical syllabus approach: some of the most common words relating to different subjects (health, work, etc.) are taught. iTONGUE. Methodology: Overcoming intercultural barriers by bilingual audio literature. Online tool.

### 1.2 FDLL Tools Invoked by Structural Approach

REFUGEE PHRASEBOOK INTERACTIVE. Methodology: It uses the syllabus approach: a second language is taught by teaching words and expressions. REFUGEE CENTER ONLINE, LANGUAGE ARTS CLASSES. Methodology: Task-based, structural approach, direct method. EXPLORING NORWEGIAN GRAMMAR. Methodology: Structural approach, whereby the user acquires notions of grammar progressively,

before attempting to produce a speech or communicate in the foreign language. Direct method, insofar as the course is delivered entirely in Norwegian (the target language).

ESOL BRITISH COUNCIL. Methodology: Task-based, structural approach, direct method. DEUTSCH LERNEN MIT DEIAA ABDULLAH. Methodology: Structural approach: the learner is introduced to language via grammatical rules, which are to be learned one at a time in a set order.

### 1.3 FDLL Tools Invoked by Communicative Approach

DEUTSCH LERNEN FÜR ARABISCH-MUTTERSPRACHLER. Methodology: The app includes 100 lessons, which combine text and audio-lingual methods. The app is available in 50 languages. The app is intended to help asylum seekers integrate into German society. Uses short sentences and in situation dialogue to help learn the language. BABBEL. Methodology: Interactive lessons with practical conversation skills from the very first lesson.

### 1.4 FDLL Tools Invoked by Text and Audio-Lingual Approach

REFUGEE SPEAKER. Methodology: The application comes with written medical translations with accompanying audio recorded by native speakers and organized into medical chapters to facilitate conversations. GERMAN FOR REFUGEES. Methodology: The app includes 100 lessons, which combine text and audio-lingual methods. The app is available in 50 languages. The app is intended to help asylum seekers integrate into German society. Uses short sentences and in situation dialogue to help learn the language.

### 1.5 FDLL Tools Invoked by Real Life Scenarios and Structural Approach

NORWEGIAN ON THE WEB. Methodology: The user studies different real-life scenarios (*ex.* taking a taxi, arriving at the hotel, etc.) and also learns the grammar, pronunciation, vocabulary associated with these contexts. NORWEGIAN LANGUAGE RESOURCES. Methodology: Immersive: the user is presented with video examples from real life situations (*ex.* at the university canteen, at the university library) where language is at play. Interactive MOOC. BLENDIN. Methodology: It includes useful information on basic topics, such as communication, finding a job, taking care of one's self and staying safe, an attempt to support young migrants in their first days in the host/receiving society.

MOVING LANGUAGES UK. Methodology: Designed to cater to different levels of linguistic competence, this application will also be useful for people who have already been living and working in their new home country for some time. The content of the mobile application covers topics that are essential during the first steps of living in the host country. More than 4000 illustrated vocabulary items for easy concept recognition.

L-PACK. Methodology: The L-PACK course consisting of 60 short videos with dialogues related to everyday life supported by grammar and comprehension activities had a big success and the materials, available on YouTube, Wikibooks and Soundcloud, were consulted in 146 countries by 120.000 learners. Short videos with dialogue.

### 1.6 FDLL Tools Invoked by Blended Approach

LANGUAGE SUPPORT FOR ADULT REFUGEES. Methodology: A mix of communicative (group discussion, etc.), visual (activities with pictures), task-based methodology (the user is required to plunge into real-world situations such as seeking work, accommodation, etc.), community language learning (*ex.* via ice breaking activities).

FALK. Methodology: Visual map of health care system developing and upgrading language skills on medical issues.

ROSETTA STONE 6. Methodology: Users can study grammar and vocabulary intuitively that grows their speaking and reading abilities.

EUROPEAN CATERING & HOSPITALITY LANGUAGE TRAINING COURSE.

Methodology: This web-based language course will enable the student to learn vocabulary and to practise communicative skills for placement abroad in a kitchen or restaurant. Realistic interactions with an animated chef and manager are the main ingredients of this course.

DANISH WITH KHALED. Methodology: The user is introduced to Danish vocabulary, grammar (*ex.* adjectives, conjugations, adverbs) via a set of on-line videos available for free on YouTube.

### 1.7 FDLL Tools Invoked by Game Based, Gamification Approach

DUOLINGO. Methodology: Duolingo has a freemium business model and it uses advertising in both its Android and iPhone apps. Duolingo courses include periodic advertisements which users can remove by paying a subscription fee. To earn money, Duolingo originally employed a crowd sourced business model, where the content came from organizations (such as CNN and BuzzFeed) that pay Duolingo to translate it Duolingo mimics the structure of video games in several ways in order to engage its users. There is a reward system in which users acquire lingots, an in-game currency that can be spent on features such as character customizations or bonus levels. There are public leader boards in which people can compete against their friends or see how they stack up against the rest of the world. The level system that Duolingo uses is XP (experience points), a numerical system that represents a user's skill level. Badges in Duolingo represent achievements that are earned from completing specific objectives or challenges. LINGVIST. Methodology: Lingvist enables users to grow their vocabulary and learn a language fast, via cutting-edge tech. Real time gamification. BUSUU.

Methodology: Speaking and writing exercises corrected by native speakers.

Community led language app, part gamification, part community powered. QUIZLET. Methodology: Education and flashcard app that makes studying easier. MONDLY.

Methodology: With Mondly, language learners can explore language exercises for reading, listening, writing and speaking, enhanced with a dictionary, verb conjugator and state-of-the-art speech recognition technology. Gamification, interactive exercises.

SHOPLANG 2.0. Methodology: The project uses the informal environment of the supermarkets in order to provoke interest in the target languages, help people develop some partial skills in understanding basic information and encourage them to take up further language learning. Learn through shopping gamification.

### 1.8 FDLL Tools Invoked by Audio-Visual Approach

POLYGLOT. Methodology: It is composed of online modules whose purpose is to give effective tools to educators and parents in order to promote bilingualism in the school and family context.

### 1.9 FDLL Tools Invoked by On-Line Chat Approach

HELLO TALK. Methodology: Online chat connecting users with native speakers of other languages.

### 1.10 FDLL Tools Invoked by Tandem, (Virtual) Language-Café Approach

METIKOS. Methodology: Informal learning methodologies (language café, tandem, virtual language café) adapted for migrants.

### *1.11 FDLL Tools Invoked by Visual Approach Using Pictograms*

REFUGEYE. Methodology: Refugee is a solution that helps people communicate using simple pictograms. Refugee also allows you to draw quickly over these icons for a better communication and understanding. Interactive app. Visual method using pictograms.

## Conclusions

Language learning is one of the most important challenges for integration, as language skills are necessary for effective functioning in the community and the workplace.

During the investigation overall 11 language teaching approaches have been identified: 3 tools invoked by audio lingual approach, 5 – by structural, 2 – by communicative, 2 – by text and audio lingual, 2 – by real life scenarios and structural approach, 5 invoked by blended approaches, 5 – by game based and/or gamification approach, 6 – by audio-visual, 1 – by on-line chat, 1 – by tandem, (virtual) language-café, 1 invoked by visual approach using pictograms.

It is expected that more investigations will be available in the future, following implementation and evaluation of these initiatives.

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# Drama-Linguistics Based Story Narration for Young Learners

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## Abstract

*The digital age has introduced different learning styles and strategies that can be employed via ICT tools [1]. In this sense, the impact of these learning mechanisms can be seen in all walks of life, including language learning. This paper aims to describe an applied and tested course design that is based on drama in the form of games narrated as stories with the help of a computer and the internet. These games take their strength from linguistics which provides support for the discourse to be utilized in a context. Besides, the way stories told in the narrative form are sure to offer a story line and recurring vocabulary that enable the use of drama in language courses. The design makes a bridge between vocabulary, grammar and language functions which integrate the four skills in an authentic context for language teaching. In this way, integrative CALL, padded through linguistics, is facilitated as the language learning platform; drama helps as a tool to narrate the stories, and ICT and other Web 2.0 tools enhance the impact of these stories through the audio-visual effects.*

*Keywords: ICT, web.2.0, linguistics, story narration, young learners, drama*

## 1. Introduction

Digital education has been on the agenda of educators for a long time in the synchronous and asynchronous modes, gaining momentum owing to the fact that 21st century is witnessing a pandemic time when all the educational contexts has had to rely on the use of ICT (Information and Communication Technologies) tools heavily to fulfil the requirements of standard education. As a result of this unexpected phenomenon, people have realized that classical education can now be shaped into blended learning form, which "blends online learning with more traditional methods of learning and development" [2]. In this sense, the impact of these learning mechanisms can be seen in all walks of life, also including language learning and teaching.

As language educators, we are all aware of the fact that the core of our work lies in the humanness and human interaction, which can be facilitated through language. Apart from the natural conversation, this interaction is also produced by means of different ways such as social media tools, e-mailing, messaging with other media means and computer-based communication. Therefore, when the world has commenced a new stride in human relations and interaction, it has become a must to meet this need on such digital platforms that digital natives [1] have got used to exploiting in life.

Under the circumstances, there remains the problem of making these non-human communication tools give the impression of human beings to live up to the expectations of people learning through virtual second lives since they are deprived of human touch and social interaction, an irreplaceable tool for language acquisition [3].

If it is considered that the core of foreign language teaching lies in the Initial Teacher

Education programs, it can be seen that the need for teacher candidates to be endowed with such competences arises. In order to offer an additional practice to the current applications on the agenda of language educators, this paper aims to describe a course content based on drama in the form of games narrated as stories with the help of digital tools. This representation intends to incorporate separate disciplines such as linguistics and ICT into language teaching for the creation of a multidisciplinary approach.

## 2. Drama and Language Teaching

Drama as an art form serves for the purpose of language teaching as it involves any kind of verbal or non-verbal human activity to produce a speech. There are countless advantages of using drama in a language classroom:

1. Through the improvisations that people can "think themselves into" a role (Holden [4], p. 1) and by doing "let's pretend" [4] types of activities, learners can transfer identity from one body to another as it often happens with children during play time. The timid and inhibited characters become more fluent and social thanks to the new role they wear through their avatars. Furthermore, as drama tasks are widely collaborative, learners can also develop their social competences [5].
2. The problem of mixed ability is decreased when drama tasks are used. While more fluent students can take the lead roles, the weaker students can make up for this lack of linguistic skill by means of other ways of language expression such as body language and general performance ability [6].
3. Drama facilitates the simulation of the outer life in the classroom. When learners encounter the real-life situations, they are motivated to learn and practise more in real life tasks.
4. Drama increases motivation and class unity. Learning by doing releases negative energy accumulated due to staying impassive for long hours, and it boosts the positive energy in the learning environment.
5. As for the context of learning, such activities assign meaning to linguistic forms by enabling the learners to experience these forms in concrete cases, also enabling holistic learning from a context [5].

Teachers are expected to leave aside their perceptions of traditional craft (Zeichner,1983 cited in [7]), but assume some other roles to be more effective in their teaching. Teachers should realize that teaching is art [8], and that they cannot become ideal teachers without lifting the filter of "anxiety" [9] before their students. As [10] states, on condition that the teacher has enough information about the class and (s)he has good rapport with the students, all ages and all degrees of aptitude should be able to benefit from taking part in drama tasks if they are prepared effectively and feel confidence in their work.

## 3. Interaction of Other Disciplines with Drama

This paper aims to lump three distinct disciplines under one practice, thus merging them in a homogeneous way:

Firstly, linguistics as an individual discipline makes its way to this application due to the fact that language itself is comprised of linguistic elements such as verbs, nouns and prepositions. Therefore, linguistics contributes to drama by means of morphology, syntax and semantics. To be more precise, word meanings [11], [12] and structures help the formation of larger units in a context, which eases holistic learning.

Secondly, ICT (Information and Communications Technology) is a great assistant, and as long as teachers can use web 2.0 tools for drama activities, they can commit new vocabulary and structures to the memory of learners through visuals, which often happens through incidental vocabulary "pick up" [13]. Moreover, digital games give the opportunity to remove affective barriers such as low motivation or lack of self-confidence, and facilitates interaction and willingness to grasp the chance [14]. Thirdly, drama as an art form boosts group dynamics and enhances learner concentration through play and games, and the abstraction of fantasy and imagination helps children gain cognitive maturity. Drama activities can be used in ELT in the forms of miming, simulation, role play, scripted play, script creation and improvisation among other applications [10].

## 4. Sample Drama Activities for Language Instruction

### 4.1 A Simulation Narration to Enhance Cognitive Maturity
This narration assigns new situations with themes such as nature, social life, health, etc. The students are seated, not looking at the teacher, who is telling a story with the help of dramatic narration.

T: ... A sudden **gust** lifts your bag and **drags** it.

A sudden **strong wind** lifts your bag and **moves it by pulling it along a surface, usually the ground**. (The teacher repeats the sentence with the word's definition in the dictionary)

(The teacher imitates the sound of a "gust", and makes the sound of something on the ground to pretend "to drag")

T: You can hear the **impact of the rain drops**. You can hear the **force or action of one rain drop hitting another.** Now a drop has fallen onto your arm, and you **shiver**.

Now a drop has fallen onto your arm and you **shake slightly because you are cold**.

T: You **curl up** to keep warm. You **sit or lie in a position with your arms and legs close to your body** to keep warm …

After the teacher finishes the narration, (s)he starts the online version of the story including some clues such as a gust of wind, and asks the learners to tell the story once more and act at the same time.

### 4.2 A Miming Narration
The teacher uses pantomime technique to transfer the verb meaning. In the narration, the teacher makes use of action verb gifs or stick figures to teach verbs with a semantic relationship to focus on the meaning (e.g., verbs related with a restaurant: eat, drink, serve, order, pay, etc. or verbs of action such as walk, jog, leap, jump, etc.). The teacher mimes the verbs and asks the students to create a story, giving some clues in the game form such as a plate, a glass, etc.

### 4.3 An Improvisation Narration Through Online Games
The narration is conducted with the help of Web 2.0 tools with which the teacher has designed a game. The online game is started by the teacher, and when the learner clicks on the button and sees a picture or a story fragment, (s)he adds a new line to the narration. The improvisation is intended to make a meaningful product (e.g., a story narration of a firefighter, or a migrating bird).

### 4.4 A Role Play Narration
The narration is conducted with a digital story including dialogues. The teacher starts the story created with a web 2.0 tool, and the learners are expected to fulfil their roles either through learning by heart or reading aloud.

… Tini Mini is talking to the Mother Nature:
MN: Hunters often poach my animals illegally, and people are burning my rainforests.
TM: What happens to wild animals then?
MN: They die, and I cannot produce enough oxygen for you

### 4.5 A script creation (*see [15]*)

### 5. Conclusion

Drama is not a remedy for classes in which no other teaching system works. On the contrary, it should be handled as a golden key to open all the heavy doors into which conventional teaching methodology cannot move. Drama should be regarded as a teaching assistant and it should be incorporated into teaching in all phases of the 3 Ps (Presentation, Practice, Production). When merged with web 2.0 tools and linguistics, it becomes an invaluable classroom resource.

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# Family Language Policy: Interdisciplinary Components of an Emerging Research Field in Regard to Childhood Bilingualism

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## Abstract

*Whereas language policy primarily dealt with the wider, state-nation policy on language use, this paper conversely focuses on the micro-level of language policy and aims to point out the critical role of families and family language policy (FLP) in shaping language practices, ideologies and language management at family domain. FLP could resist broader language ideologies by transforming family language ideologies into language practices and language management that support the development of active or additional childhood bilingualism. Through a review of the interdisciplinary components of family language policy, this paper aims to illustrate qualitative aspects of non nonlinear, multilevel and dynamic relationships between each one of these core components and childhood bilingualism. In this review, an introduction to family language policy as a research field is included as well as some of the pioneering researches that attempted to spotlight the way parental agency in regard to each of the three FLP components could shape, explicitly or implicitly, language policy and language use into the family domain. Research on family language policy could be a valuable resource and tool in order for policy-makers or schools to be enlightened and support the maintenance of minority/heritage/community languages and the development of childhood bi- or multilingualism and language learning through language education policy, bilingual education and, for teachers, culturally sensitive and well- structured bilingual methods in classroom teaching.*

*Keywords: family language policy, bilingualism, minority/heritage/second language, language acquisition, home literacy practices*

## 1. Introduction

Family is a distinct sociolinguistic domain that shapes a significant sociocultural context. Research on linguistic practices of family context, where macro- and micro-sociolinguistic realities intertwine, substantially contributes to the development of theories for children's language socialization and language acquisition.

Diverse family backgrounds – relating to the cultural origin of parents and/or home languages – indicate that children will be socialized into at least two distinct 'communities of practice'. As a 'community of practice', family members could follow different norms in terms of language use and language culture rather than follow the dominant/majority language norms [1]. More specifically, according to Lanza (2007), in case one of the parents or both parents' language(s) is not the language of the wider community ("foster bilingualism"), "family bilingualism" arises. Especially when social bilingualism or multilingualism is not the mainstream language norm, those families face daily

challenges in their attempts to cultivate childhood bi- or multilingualism and maintain minority or heritage language(s) which usually stand as children's second language(s).

## 2. Family Language Policy as a Research Field

Exploring the relationship between the individual, family and community, family language policy (FLP) aims for answering questions such as: why do some immigrant groups maintain their language, while others do not; why do some children become bilingual in monolingual societies, while others are raised as monolinguals in bilingual or multilingual communities, etc. FLP is a growing and useful field of research, as it bridges the gap between, draws from and contributes to other research fields like (education) language policy, child language and literacy acquisition and language socialization.

FLP refers to parents' explicit and/or implicit language planning for language use between family members [2]. In line with the Spolsky (2004) approach, similarly to language policy, FLP consists of three basic components: language practices, language management or planning and language ideologies [3]. In this field, research focuses on how parental language strategies and ideologies towards language(s), bilingualism and childhood language acquisition are influenced by the dominant sociolinguistic and sociocultural norms (e.g., dominant language and language ideologies, language education policy, etc.) [4] and how the parental agency, in turn, affects:

(a) the awareness of, the implementation, and/or negotiation of language policy and language planning in the family context, and (b) children's mental and bilingual development, school performance and, ultimately, the maintenance of the minority/heritage language(s) [5].
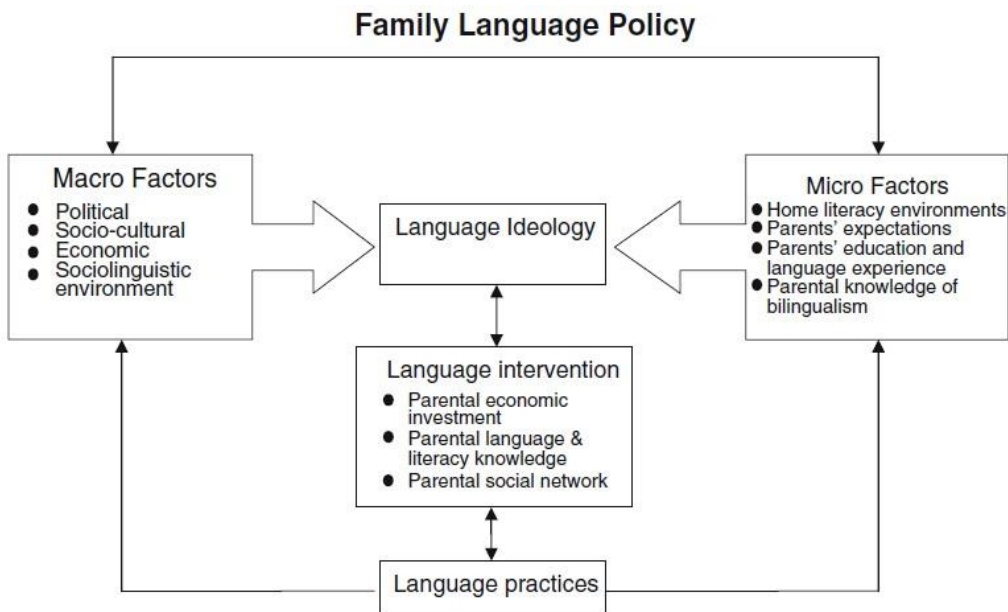


*Fig. 1. Interdisciplinary model of FLP (Curdt-Christiansen, 2009)*

## 3. Models of Family Language Use

Language practices refer to patterns of language use within the family, through which family members realize, negotiate and modify their FLP in face-to-face communication.

Additionally, the relationship between frequency and the quality of language stimuli in the majority and/or minority language use plays a crucial role in the development of each of the languages.

Barron-Hauwaert (2004) analysed seven types of language use within the family context: (a) 'OPOL-ML' (one parent, one language – majority language), (b) 'OPOL-mL' (one parent, one language – minority language), (c) 'Minority-Language at Home' (mL@H), (d) 'Trilingual or multilingual strategy', (e) 'Mixed strategy', (f) 'Time and place strategy', and (g) 'Artificial' or 'Non-Native strategy' [6].

While OPOL results are varied, research highlights Minority-Language at Home or OPOL-mL as the two most successful models for children's minority language use [7]; in these models, both parents primarily use the minority language at home or both parents speak the minority language at home and one of them uses the dominant language at the same time. De Houwer's findings (2003) showcased that the use of the dominant language at home is not an obstacle for the transmission of the minority language.

OPOL's success could lay on family language ideologies, the quality of the "language input environment" and the very specific parental discourse strategies.

## 4. Family Language Management and Childhood Bilingualism

Family language management (FLM) is defined as the implicit/explicit and subconscious/conscious parental involvement towards the establishment of those language conditions which support language learning and literacy acquisition of the minority language(s) at home and/or community settings [8]. This definition completes the theoretical framework of Spolsky (2004), taking into account family literacy practices as part of FLM. There are two main trends in FLM: (a) parental language choices on which language(s) to use in parent-child(ren) interactions, discourse strategies that parents adopt, more or less consistently, in their language interactions with the child(ren) and home literacy practices (internal control for F) parental agency in search of heteroglossia spaces towards the development of childhood bilingualism and/or biliteracy and the maintenance of the minority language(s) (external control for FLP) [9].

Lanza (2007) showcased a link between OPOL language strategies and children's switching languages or language codes.

Code-switching or switching from the 'established' language to the other one is referred to as 'mixing'. The researcher identified five types of strategies represented within a linguistic continuum in which the left end stands for monolingual strategies and the other one for bilingual strategies integrated into parent-child(ren) interactions:
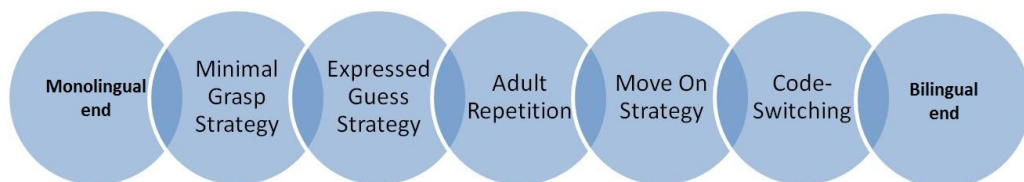


*Fig. 2. Language strategies in the monolingual-bilingual continuum (Lanza, 2007)*

Lanza's analysis led to the conclusion that childhood active/productive bilingualism is more likely to develop, especially when the parent, who uses the minority language, applies strategies corresponding to the monolingual context. However, Döpke (1992), who studied interactive strategies between parents and children, argued that the quality of parent-child interaction is more important for the development of active bilingualism compared to the number of stimuli in the minority language [10]. A different approach,

called 'happy lingual', is adopted by some parents to maintain the minority language; in that case, code-switching and the bilingual phenomenon are perceived as a 'qualification' [11].

However, language strategies, such as the above, may not be sufficient for the development of literacy in the minority language; active bilingualism in terms of oral language skills is not equal to additive bilingualism, which includes biliteracy. Biliteracy in the minority and the dominant language involves any form of interaction taking place in two (or more) languages through written text or in relation to a written text ("... in and around the written text") [12]. Schwartz (2008) highlighted the impact of literacy practices on the higher level of performance achieved by children in tests in the minority language [13]. Parental engagement to creative language activities and children's active reading in the minority language is linked to extended knowledge of vocabulary. Hashimoto and Lee (2011) in their qualitative study of three immigrant families of Japanese origin, residing in the USA, revealed that parents modified their practices, materials and resources to stimulate children's interest and enhance the functionality of literacy in the everyday life of the family [14].

Regarding the external control of FLM, parents could explore bilingual education programmes, bilingual schools or minority/community/complementary schools for the maintenance of children's second language. According to research by Leung and Uchikoshi (2012), advanced language skills of primary first-grade children in the dominant and the minority language connect to their participation in their mainstream's school monolingual or bilingual class in conjunction with family language practices [15].

In a survey carried out by Mattheoudakis *et al.*, (2017) on the FLP of Albanian families in Greece, parental language management towards Albanian language literacy, both at home and the community (in the form of complementary classes) are linked to: (a) the acquisition of advanced bilingual skills and (b) children's commitment to the minority language, as shown by the extended use of the Albanian language in parents-children interactions, compared to children whose parents are more committed to the dominant (Greek) language [16].

## 5. Family Language Ideologies

The family model of language use could reflect broader ideologies and practices in relation to language(s) as well as parents' attitudes of parenting and children's bilingual development. According to Schiffman (2006), language ideologies are unconsciously evaluations of the social usefulness of a language or language variety in a given society that reflect values and patterns embedded in language culture [17]. According to Myers-Scotton (2006), attitudes are distinguished from ideologies, as ideologies are more constructed evaluations [18].

Yamamoto (2001) studied bilingual families in Japan and showcased that the international importance of the English language and the high status of English in the Japanese educational system encourage parents' positive attitudes towards the bilingual development of their children. On the contrary, parents who express negative attitudes towards bilingualism and discourage the development of the minority language at home attempt to eliminate the linguistic, social and cultural distance in relation to the wider Japanese society [19]. Curdt-Christiansen (2009) studied how values, beliefs and practices as well as power differences in a minority context shape language ideologies and relevant language practices of immigrant Chinese parents in Quebec of Canada.

However, parents' linguistic ideologies and positive attitudes towards languages or bilingual development are not always transformed into relevant language practices and language management that contributes to active or additional childhood bilingualism

[20]. Parental beliefs and attitudes towards family language planning may be influenced by public discourses (media, school, etc.) and specific aspects of parenting in the host country, although parents may rely on their language experiences and selectively draw information from expert advice and popular literature (press, internet, textbooks, articles on bilingual development and education, etc.) [21].

A different group of research focuses on parental beliefs and attitudes which are related to children's language acquisition. De Houwer (1999) represented parental attitudes towards a particular language, bilingual development or specific language choices and strategies in a continuum (negative/neutral/positive attitudes) and distinguished them from parental impact beliefs. Impact beliefs are related to parental perceptions of how parents view themselves as (un)capable of shaping and monitoring their children's bilingual development. De Houwer (1999) also represented strong and weak parental impact beliefs in a continuum.

## 6. Conclusion and Further Perspectives

The effect of FLP on children's bilingual skills is not unidirectional and linear but dynamic and multifaceted. Although parents' language ideologies might be the driving force of FLP, Schwartz (2008) showcased that children's practice in reading in the minority language, parents' language practices and children's positive attitudes towards the minority language are the strongest factors in acquiring the vocabulary in the minority language and that parental ideologies had a minor impact on children's command of the minority language. Therefore, future studies need to include and extensively investigate child agency towards language use as part of the formation of FLP and its relevant outcomes for children's bilingual skills.

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# Impact of Intercultural Communication Apprehension upon Students' Plurilingual and Pluricultural Competence Development

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## Abstract

*Efficient communication is the basis for person's satisfaction with mutually beneficial relationships in personal, academic and professional fields. To be efficient in today's global cross-cultural encounters citizens need plurilingual and pluricultural communicative competences. However, students who aim at developing their plurilingual competences at higher education institutions often exhibit communication apprehension, fear of speaking, anxiety of public speaking, are afraid of communication breakdowns, miscommunication and failure in general and, thus, face difficulties in using foreign languages in real life situations. The study aimed, first, at identifying the level of intercultural communication apprehension as a possible hindrance to efficient plurilingual competence development and, second, to find out if conscious and planned attention to affective domain during the language learning classes can assist language learners in developing their higher self-confidence and defeat of fear, thus ensuring the development of plurilingual and pluricultural communication skills which, consequently, leading to more successful communication. The study used quantitative and qualitative research methods. Personal Report of Communication Apprehension (PRCA-24) [18] and Personal Report of Intercultural Communication Apprehension (PRICA) [19] were employed to identify the level of students' general and intercultural communication apprehension. The research respondents (n=114) were students of English for Intercultural Communication (C1 level [11]) who studied the course in 2018-2020. A model of ADM activities was created and implemented in the course, which provided promising results in favour of explicit communication apprehension defeat training during the language classes. The conclusion is drawn that recognition of communication apprehension as a natural human feature which can be managed and explicit training in how to deal with communication breakdowns can lead to more successful acquisition of plurilingual and pluricultural competences.*

*Keywords: Plurilingual and pluricultural competences, intercultural communication apprehension, affective domain, affective domain management*

## 1. Introduction

Intercultural communication (hereinafter, IC) has become a necessity for contemporary people living in the globalized world; thus, good communication skills in general and proper IC skills in particular have become indispensable [9], [10]. However, not all people feel confident and empowered to face these challenges as to become a good communicator internationally-wise requires a lot of practice and experience.

Consequently, insufficient acquisition of communication skills might cause unwanted

communication breakdowns, miscommunication and failed communication in general, which may be accompanied with the feelings of tension, situation anxiety and stress.

Therefore, the study aimed at determining the level of students' IC apprehension, seeing it to be the hindrance for efficient plurilingual competence acquisition and development, and finding out if conscious and planned attention to affective domain during the language learning classes can assist language learners in developing their higher self-confidence and defeat of fear, and, thus, lead to more successful communicative practices.

## 2. Literature Review

The affective domain, referred to since Socrates, Platos and Aristotle's times [2], taken into account in Dewey's progressive education movement, Montessori's education theories, Maslow's humanistic psychology, and Roger's humanistic approaches to education [22], gained grounds in scientific studies throughout the end of the 20th and beginning of the 21st centuries, since its inclusion in Bloom's taxonomy of educational objectives in 1950s [6], and a more specific taxonomy of objectives of affective domain a decade later [15]. Affective filter hypothesis [14], recognition that "affection and cognition are complementary and cannot be developed independently during the learning process" [21] and call for integrative approach [3] have led to numerous studies which indicate the importance of attention to affective factors in language learning. The researchers [2], [7], [23] conceptualize the affective domain as the emotional side of human behaviour which can be juxtaposed to the cognitive side. The concept of *affective domain* is used here to mean feelings while studying the language, emotions, and attitudes towards the language and studying experienced during the language learning or, using the CEFR concept, *plurilingual competence* acquisition and development, i.e., "the dynamic and developing linguistic repertoire of an individual user/learner [11].

*Communication apprehension* (hereinafter, CA) was originally conceptualized in 1970 as anxiety related to oral communication and later modified as "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons" [17, p. 78]. Thus, CA was first understood as a trait characteristic related to a person's temperament, "a learned trait", explained by "learned helplessness" theory [4, p. 219]. Researchers [4], [7], [12], [14], [18] recognize that language anxiety or apprehension occur when people are expected to perform in the target language.

*Intercultural communication apprehension* (hereinafter, ICA) was conceptualised by researchers [5] as "the fear or anxiety associated with either real or anticipated interaction with people of different groups, especially cultural and ethnic and/or racial groups" [21, p. 146]. In this study, ICA will be defined as fear, tension, lack of self-confidence and anxiety in relation to real or anticipated communication with other people individually or in group discussions, speaking in front of the audience in monolingual as well as multilingual and multicultural group.

## 2. Methods

### *2.1 Research Aim and Objectives*
The **aim** of the study was to identify the effect of affective factors upon students' plurilingual competence development. The objectives were set to identify the students' level of general CA and ICA and to create and implement a model of Affective Domain Management (hereinafter, ADM) to find out if conscious attention to CA can assist students in language learning.

### 2.2 Participants

A non-probability convenience **sampling** was chosen for the research as the research respondents (n=114) were the students of English for IC (C1 level, according to [11]) who studied the course in 2018-2019. 63% of the research participants were females and 37% males; 89% were Lithuanians and 11% were visiting students from 5 countries (Italy, Hong Kong, Kazahstan, Spain and Portugal). As only 9.6% of the students were from outside Lithuania, no country comparisons have been made.

### 2.3 Instruments and Procedures

The study used quantitative (four surveys) and qualitative (analysis of narratives) research methods (due to the article volume constraints, only quantitative data will be analysed). Two research instruments were designed: *Initial questionnaire,* to identify the students' expectations and possible worries regarding oral participation, and *the exit questionnaire,* to identify the students' opinion on the impact of ADM on the course learning outcomes. Two other research **instruments** – *Personal Report of CA* (PRCA-24) [20] and *Personal Report of ICA* (PRICA) [21], which focused on determining person's CA in group discussions (hereinafter, GD), participation in meetings & lecture discussions (M&LD) and giving a public speech/presentation (PP) were employed to identify the level of students' CA and ICA [6]. Apart from the questionnaire surveys, a model of ADM, consisting of five categories (receiving, responding, valuing, organizing and characterizing) of affective domain, as discerned by Bloom [6], was constructed and implemented, seeking to determine if conscious and planned attention to affective domain (feelings, emotions, and attitudes) during the language learning classes can assist students in reducing their CA, which, consequently leads to more efficient communication.

## 3. Research Findings

### 3.1 Communication Apprehension Experienced During Language Learning

For this study, CA in three areas of classroom work will be analysed: CA caused by or due to participating in GD, M&LD and giving a PP, as these are the most frequent areas related to uncertainty and found be researchers to cause CA [1], [2], [3], [9], [10], [19]. First, it was identified that students' level of CA while **participating in GD** is moderate: over half of them like getting involved in GD (62%), being engaged and feel generally comfortable (both 57%) and two fifths (43%) admitted feeling tense and nervous in GD in general. More than half of the respondents, engaging in GD with *new* people felt tension and nervousness. Analysing the results of PRICA on the same issue it is evident that students are more likely to get involved in GD with others who are from different cultures (18.5% strongly agreed and 51.9% agreed). Yet even two thirds of them (74.6%) admitted getting nervous while participating in GD with a foreigner and agreed (73.5%) having a fear of speaking up.

Second, the analysis of the level of CA experienced due to **participation in M&LD** shows that the level of students' CA was almost equally distributed in two dichotomous ways: half of the students (48%) agreed that they were usually calm and relaxed, and almost the other half (43%) admitted not being calm and relaxed while participating in M&LD. It is interesting to note that even 62% of them admitted feeling not very calm and relaxed when they were called upon to express their opinion in a M&LD and only each fifth was calm and relaxed in this situation. In addition, one out of three respondents were afraid to express themselves and even 43% were not relaxed when they had to answer questions in M&LD.

Third, identifying the level of CA while **giving a PP**, which is a usual assignment in

advanced language level classrooms, almost three out of four students admitted that even if they expect to give a speech with confidence (71%), "certain parts of their body feel very tense and rigid while I am giving a speech" (71%), they have fear and cannot relax (67% both), for 43% of them their thoughts become confused and jumbled (see Fig. 1). Each third felt getting so nervous that they tended to forget the facts they really knew. Taking into account that presenting a public speech is part of the mandatory activities of any advanced language class, it is possible to state that having high CA can have a serious impact upon the students' language competence development.
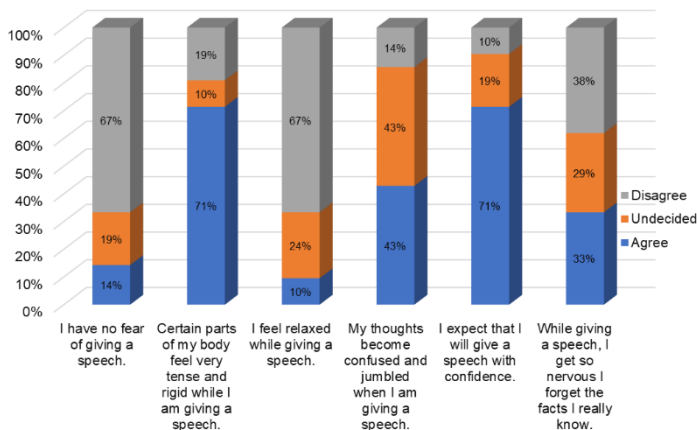


*Fig. 1. Communication apprehension while giving a speech/presentation*

The analysis of the PRICA results revealed that more than half of the respondents (58.8%) exhibited a moderate level of anxiety; whereas 28.9% of the respondents scored lower than 33 with each tenth between 17-20. Only 14, i.e., 12.3% of the respondents appeared to have a very high level of ICA, between 62-64. According to the authors of PRICA [20], as the scores may range from 14 to 70, a score above 52 indicates a "high" level of ICA, while a score below 32 shows low anxiety. A person with a moderate level of anxiety in intercultural situations will score between 32-52.

### 3.2 Affective Domain Management Model

To determine if conscious and planned attention to affective domain (feelings, emotions, and attitudes) during the English language and IC classes can assist students in reducing their CA and developing their higher self-confidence, necessary in (intercultural) communication, a model of ADM was created on the basis of Bloom's taxonomy of affective domain [6], [8], [21] and integrated in the regular English for IC (C1 level) classes. The model employed five categories (receiving, responding, valuing, organizing and characterizing) of the affective domain, and included activities provided for students in class and outside the class, on their own. The focus was on raising students' awareness about ADM, helping them to gain efficient ADM skills and expecting that acquisition of these skills. It is expected that the skills gained through the integration of ADM skills will further assist them in becoming more active language learners and users and will allow them to gain fluent and accurate plurilingual and pluricultural communication skills that will, consequently, lead to more successful IC.

### 3.3 Exit Evaluation of Student ADM

Having undergone the training into the ADM during the regular courses of English for IC classes, the students filled in the course exit questionnaire to identify their satisfaction with class atmosphere, class organization and impact of ADM activities upon their CA.

The absolute majority of the students were satisfied with the positive and non-threatening classroom atmosphere created in the language learning class and admitted being encouraged and motivated to learn the language and ADM. Students were also content with class activities, agreeing that they were meaningful (79%). Researching the emotional dispositions students had in learning the language in this class, it was found out that students exhibited rather positive emotions (see Fig. 2), they enjoyed studying the language in the current class (77%) and found language learning an enjoyable activity because they could observe the progress they were making (73%).
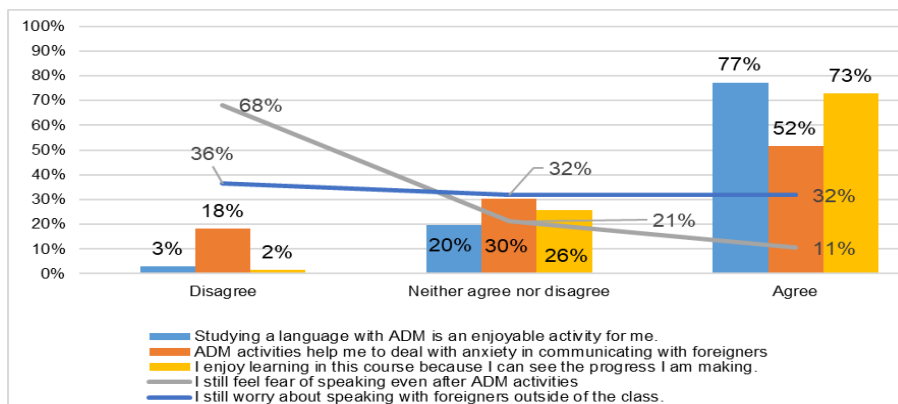


*Fig. 2. Students' assessed impact of ADM activities upon communication apprehension*

Over half of the respondents agreed that ADM activities help them to deal with anxiety in real target language use situations. The statement inquiring if the research respondents worried when they had a chance to speak outside the class yielded almost equal distribution of responses in all three categories of choice. As the results show, one tenth admitted still feeling fear of speaking even after the ADM treatment, but the majority admitted not feeling any fear (68%).

## 4. Discussion and Conclusions

The analysis of the identified general level of students' CA in participating in GD, M&LD shows that the level of CA of the majority of the respondents is moderate, i.e., the students' attitude is rather positive as over half of them like getting involved in GD, being engaged and are generally comfortable while participating in GD, as they participate in familiar environment with the people they already know. However, engaging in group discussions with new people, more than each second of the respondents felt tension and nervousness. Another interesting insight obtained from PRICA results was that being advanced users of the English language, the respondents have intentions to use the language in practical IC situations (they like participating in GD with people from other countries), but the overwhelming majority still felt nervous and had fear of speaking which leads to the conclusion that they need to work on and learn ADM skills. Next, the data of research into CA in M&LD were equally distributed in two directions: half of the students admitted feeling calm and relaxed, and a slightly lower number of the

respondents felt CA. It is interesting to note that the majority admitted feeling not very calm and relaxed when they were to participate in M&LD not on a voluntary basis, but being called upon to express their opinion.

Furthermore, the implemented model of ADM, which consisted of open discussions and inter-cultural communication awareness raising exercises, and the students' assessment of its implementation allow to conclude that recognition of CA as a natural human feature, which can be overcome, and explicit teaching on how to defeat its breakdowns can lead to higher motivation and learning satisfaction of language learners and more successful intercultural communication, consequently, to plurilingual and intercultural competence acquisition and development.

However, further research is needed to identify the impact of ICA and correlation between other factors, such as students cross-cultural experience, personality factors (inhibition, risk-taking, temperament), language achievement and others.

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# Page to Stage: Dramatizing Literature for Language and Life Skills

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## Abstract

*Literature is trending in English language teaching as a platform for organic language engagement. [1], [2] Literature provides a springboard for imagination, higher order thinking, knowledge of self, society, history and culture as well as contextualized practice in reading, writing, listening, and speaking. [3] However, educators may lack strategies for embracing literature, and students may miss its benefits. Another under-utilized approach in language education, drama, can be enlisted to mine the riches of literature. [4], [5]*

*This paper summarizes an MA dissertation by Shannon Parks [6] on a longitudinal qualitative research analysing the effects of dramatizing literature and language arts on English learners' language and life skills. Performances took place from 2013 to 2020 at a tertiary institution in Kuwait through an initiative called R.E.A.L.L., Read English Actively for Language and Life Skills. Created by Senior Language Educator Alison Larkin Koushki, In R.E.A.L.L. teams, students read, imagine, draw, narrate, and act the story. Multiple intelligences deploy [7] as students choose project roles: script, acting, backstage, costumes, make-up, sound and lights, reporter, advertising, or stage managing. Learners enhance language skills while mining the riches of literature, the arts, and project-based learning.*

*Using qualitative research methods and a grounded-theory approach, twenty-seven students were interviewed on their R.E.A.L.L. experience in a semi-structured format. Interviews assessed the effects of R.E.A.L.L. on students' English proficiency, intrinsic motivation, and life skills including creativity, collaboration, critical thinking, and confidence. Using Otter, a program that records, transcribes, and categorizes words from interviews, emerging themes were traced to determine R.E.A.L.L.'s impact on students' post-performance.*

*The overall results of the study suggest that students perceive, in themselves and others, growth in English language, life skills, and self-determinism. Implications are important for the Arabian Gulf where many students are sub-literate. More importantly, however, by gathering students' retrospective insights about how their R.E.A.L.L. experience has enriched their English and life skills, this whole-language, whole-person, all-senses approach can be refined and duplicated to benefit English learners everywhere.*

*Keywords: Drama Literature Creativity Project Learning English*

## 1. Introduction

Alison, who has been observing her students grow in numerous areas in their lives as a result of English through the arts, was eager to obtain empirical evidence – from the students themselves [8] – to verify this. Alison is not alone as many other teachers

want to substantiate the benefits of 'Drama in Education' (DiE). [p. 43], [9] The intent of this study is to measure the benefits of Alison's drama productions, namely the students' perceived improvement of their English and life skills.

## 2. Literature Review

Literature as content in the EFL classroom offers an effective way of integrating the development of the four language skills. [10], [11], [12], [13], [14] In addition, reading and performing literature provide ways to develop other skills, such as teamwork, stage presence, articulation and many other abilities. [15]

Drama fosters confidence since learners are given the opportunity to experience English in operation. [16], [17] Additionally, drama empowers the student, giving them the opportunity to take pride in their hard work, creativity, initiative and teamwork. [18]

English through the arts is effective in developing the skill of communication because it integrates in creative and dynamic ways 'various components of communicative competence (discourse intonation, pragmatic awareness, nonverbal communication).' [p. 126], [19] Participants, through dramatic productions, learn much about this skill of reading non-verbal signals, which 'supplement, augment, or substitute for verbal communication' [p. 145], [20], and include 'physical appearance and posture physical proximity, eye contact, facial and head movements, and gestures of the arms and hands'. [p. 145], [21]

The performing arts provide opportunities in critical thinking and creativity, or as Royka [22] puts it, 'creative tension' (situations that require solutions). Performing arts for the L2 learners can provide the opportunity to foster their imagination. The participants can go beyond the present time and space and even walk in the shoes of another. [23] Carson [24] discovered her students felt less stressed and freer to be themselves as a result of involvement in drama, and this decreased their inhibitions.

Related to this, acting out literature provides the opportunity to release emotion and relieve the tension that accompanies learning a second language, which is done in a safe and nurturing environment where others can share collaboratively in the experience. [25]

As for motivation, Ryan-Scheutz and Colangelo [26] found that students in the performing arts were greatly motivated and devoted towards competency and accuracy because of their pride in the final outcome of the public performance.

The student-centered approach means a more hands-on and active approach to learning versus a teacher-centered or a lecture-style approach. [27] Through active learning, 'students are constructing their own knowledge, rather than receiving it'. [p. 44], [28] Alison recounts an incident that epitomizes the student-centered environment when a student enthusiastically commandeered her teaching podium in class to share a song that represented the novel *Frankenstein*, which the class was studying. At first, Alison found herself resisting this student-initiated episode, but then her 'wise teacher' voice reminded her that the goal of learning is enthusiasm and engagement. The song was perfect for the novel, entitled 'Bring Me to Life' [29]

Teachers and administrators often complain that students are not engaging in their courses, and Koushki's [30] response to this dilemma is:

English through the arts is very much a whole language phenomenon …
The language profession has gone on a completely wrong track
by trying to separate language into little discrete parts … separating it
out of its context is so wrong, and it needs to be put back into the
context of communication … That is certainly part of English
through the arts.

Dervishaj [p. 58], [31] asserts that drama places learners in situations that seem authentic, thereby making language 'more easily internalized and remembered'.

## 3. Methodology

The analysis of this study provides empirical evidence that student involvement in the arts improves their English language and life skills. The research questions were as follows:

1) How are the four language skills (reading, writing, listening and speaking) improved in EFL students through this work?
2) How are the seven life skills (communication, confidence, creativity, commitment, critical thinking, compromise and collaboration) developed through R.E.A.L.L.?
3) What other ways have the students developed, particularly in capabilities that they find meaningful?
4) How could R.E.A.L.L. be more effective?

By using a semi-structured format in the interviews, participants were encouraged to discuss freely and honestly, making the interpretation and analysis insightful and meaningful. This fills a research gap by contributing knowledge which is grounded in data.

## 4. Results

All twenty-seven interview participants affirmed that their English skills have improved through their performing arts experience with Alison.

*Fig. 1. Students Citing Growth in English Language Skills*

| English Language Skill | Reading | Writing | Listening | Speaking | Vocabulary |
|---|---|---|---|---|---|
| Number of students who recognized growth in that area | 17 | 10 | 14 | 18 | 10 |

Additionally, a host of other skills and abilities have developed, according to students' self-perception, as can be seen in the following chart:

*Fig. 2. Life Skills/Attributes and Number of Students Who have Grown in Those Areas*

| Life Skills/Attributes | Number of students who cited growth in these skills/attributes |
|---|---|
| Confidence | 27 |
| Communication | 24 |
| Commitment | 19 |
| Creativity | 19 |
| Collaboration | 18 |
| Compromise | 15 |
| Critical Thinking | 13 |

Having examined how language and life skills have increased as a result of participation in the performing arts (at least according to interviewees' perceptions), other themes that emerged from the data were examined. These themes emerged as a result of the inductive part of the interviews when the interlocutors were able to respond to the open-ended questions. The figure below shows the foundational nature of opportunity,

self-discovery, motivation, and new experience and how they provide a way for the life skills to take root, leading to the development of other abilities. The two-way arrows indicate the recursive process of all of these elements. For example, opportunity provides self-discovery, which, in turn, allows practice in presentations, which yields yet more opportunity to foster other skills, including students finding their voice to make recommendations, which feeds back into opportunity. All of this ultimately leads to shaping the trajectory of their futures and who they become as individuals.
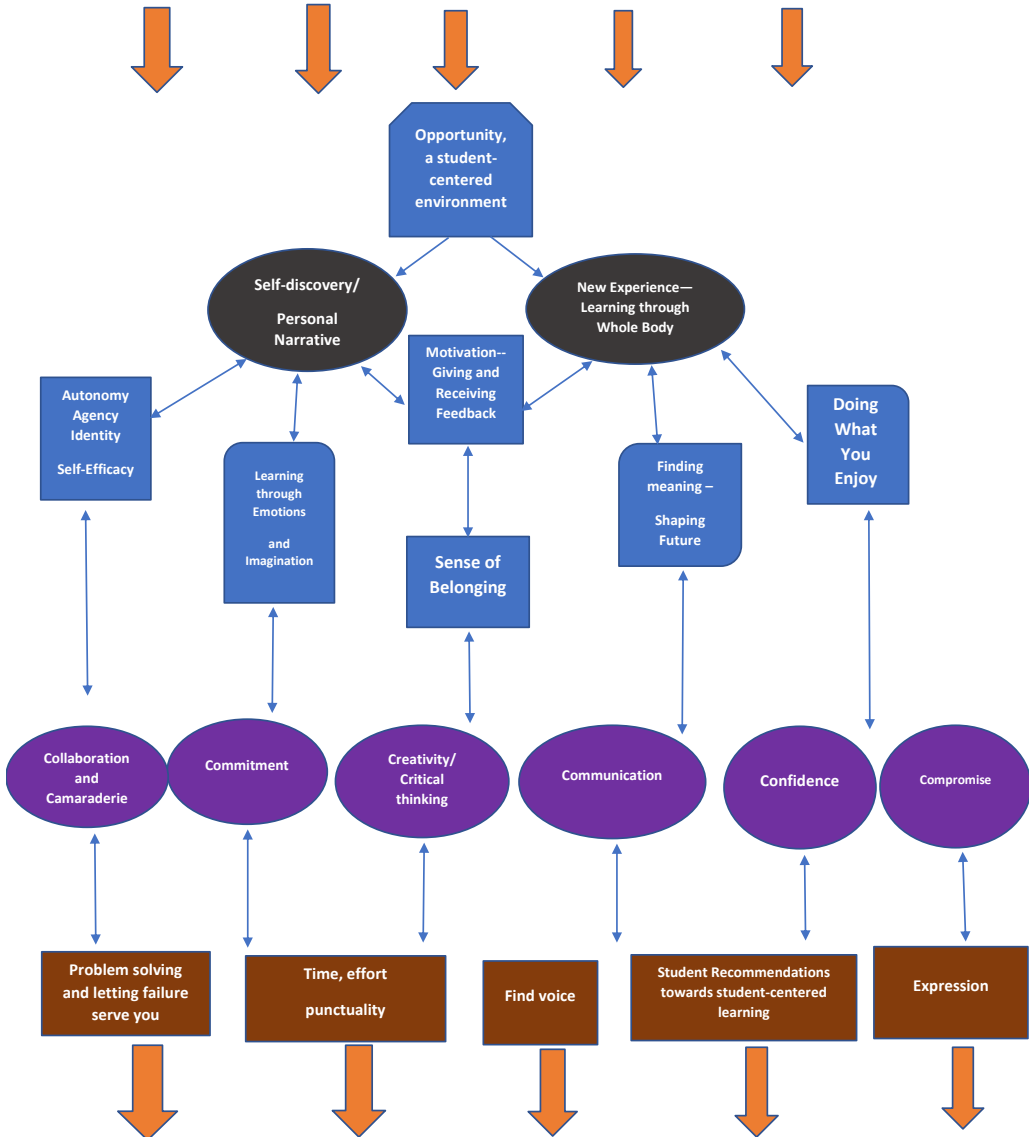
*Fig. 3. Theory in-Process: Other Emerging Themes and their Recursive Effects on Life Skills*

## 5. Conclusion

The implications of this research are especially important in the Arabian Gulf, where many of the students coming to the university from public schools are subliterate. As instructors in a media-saturated culture, lessons that are delivered through lectures will likely fail to engage the students. If enacting literature kindles a passion for reading and provides a setting where language and life skills can flourish, this should be investigated further, and measures should be taken to implement this in other contexts. The data presented here is compelling, especially since many of the reflections are longitudinal in nature. In addition, overall, the data points to at least the students' perceived improvement in English and life skills, their satisfaction in their experience, and their continued motivation to progress even more in these areas.

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# Teacher's Professional Development

# An International Research Network to Connect Social Emotional Learning and Career Development

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## Abstract

*More than in the past teachers and educators are requested to cope with the many challenges that came from a technological and globalized world. Resilient educators able to meet their students' needs and prepare them to be ready to successfully enter the future world of work require educators highly equipped. Accordingly, the framework to which CASEL has given substance in more than twenty years of research to the promotion of a series of skills that allow the development of resources and strengths as well as to prevent counterproductive behaviour and unsatisfactory results appears to be crucial. With this in mind, an international research network (IRN) was launched in 2018 to examine first, the educator perspective on the nature and value of social emotional learning, and secondly, to outline an educator SEL self-efficacy measure. Researchers from 20 countries, among which China, Finland, Germany, Greece, Guatemala, Israel, Italy, Japan, Korea, Portugal, Romania, Scotland, South Africa, Turkey, Uganda, Singapore, and United States collected data with a research protocol that included three open questions. They met for the first time at the university of Padova, Italy, on July 2019 to discuss the first preliminary results. Using NVivo, a coding booklet was, in fact, developed for analysing answers provided by participants. The experience of this international collaboration will be presented and cross-cultural reflections on these results will be discussed. Some insights will be also provided on the second phase that aims to establish a new, cross-cultural SEL measure and help educators access to research-based positive development resources.*

## 1. Introduction

The technological and globalized world that characterize our time have a profound impact also on education. More than in the past teachers and educators are requested to cope with the many challenges that came from a technological and globalized world.

Studies on megatrends about the future of work and societies depict very complex scenarios. Ten challenges are reported for example in the 'Long-Term Megatrends 2020' [1] report published by the Italian Institute for the Future: Internet decoupling with more than one DNS root zone; The gap between the urban world and the provincial (or rural) one; A renewed interest in psychedelic research for patients with depression and many other neurological diseases; The escalating space arms race and the development of hypersonic arms; The intergenerational conflict; Toward a new green deal; Quantum supremacy to solve a problem that classical computers practically cannot; The growing importance of Artic; an increasing escalation of far-right terrorism; The pet boom. As in many reports like this the pandemic was not included.

Possible future scenarios are constantly characterized by the uncertainty that a specific combination of events, some of them not predictable, completely change present and future choices. Globalization and social media play a crucial role as sounding board of many events and situations, making difficult understanding their importance, anticipating consequences, decision making and future planning. The COVID-19 situation we are experiencing is an example of the high complexity of our world where a very unexpected event changed the lifestyle of many countries and impacted many sectors of the society, from the single to the groups to the nations.

Actually, the importance of taking care of the future is recommended also by many international organizations that, as the UN, remarks the need to devote more effort to environmental, economic and social sustainability. Education of quality for all and dignified work are some of the sustainability goals that teachers and educators are called to pursue with their job in order to increase the opportunity of a better personal and working life for their students and their communities. Positive outcomes could be in fact seen as something that transcends the here and now of the school walls to pour into people's contexts of life for the present and the future. It is evident that teachers and educators play a significant role as concern both content related activities as well as an articulated set of life skills and competences that include the social and emotional ones.

Accordingly, taking into consideration how teachers perceived their social and emotional competences as group of professionals engaged in youth development emerge as crucial. Research in fact shows that Social and emotional learning (SEL) is relevant also for the teachers' experience at work and this is related to teacher's stress and job satisfaction [2] as well as to class management and children success [3].

With all this in mind, this project aims to study how teachers and educators' value these competences and the relation they perceive with the future school and career development of their students.

### 1.2 The CASEL Model

With the aim of focusing on positive youth development we found in the work done by the United States by the Collaborative for Academic, Social, and Emotional Learning (CASEL) one useful model for anchoring our project. The systemic social and emotional learning model (SEL) is defined as the process through which children and adults effectively acquire and apply the knowledge, attitudes and skills necessary to understand and manage emotions, to establish and achieve goals, to try and show empathy for others, to establish and maintain relationships positive, and to take decisions responsibly [4].

As it can be seen from the wheel with which it is represented, this framework has its core right in the center of the model with the individual social emotional development and the five core competencies: self-awareness, that is knowing personal strengths and limitations; self-management, that is effectively managing negative emotions, and setting and achieving goals; social awareness, that is understanding and empathizing others' feelings and perspectives; social management, that is using positive interactional and cooperative skills; and decision making, that is making valuable and effective choices about personal behaviour and social interaction. All of this is very much grounded in the settings where kids and adults spend their time. Obviously, classrooms and schools but also partnerships with families and communities are taken into account. Accordingly, research and practice efforts are devoted to thinking about how to optimize conditions for social and emotional development in all of those settings and elaborate solutions and working path. Its relevance is testified by more than 20 years of research that show its many positive outcomes for students as concern school success and performance, mental health and adaptive behaviours, positive developmental support [5], [6].

## 2. The Project

The World Educational Research Association International Research Network (SEL IRN) was started on May 2018 thanks to the initiative of Lea Ferrari (Italy) and V. Scott Solberg (United States), and the project coordinator Chong Park (United States). It is being conducted as part of a larger cross-cultural research program referred to as *Connecting Social and Emotional Learning to Professional Development for Educators and Effective Teaching* and is formally recognized by the World Education Research Association as an International Research Network *(2019-2022).* Research teams from 15 countries are exploring educator perspectives on the nature and value of SEL and its connection to school and career development of their students.

### 2.1 The Measure

The group of career development researchers, collectively designed a qualitative survey questionnaire that aims to examine educators' perceptions on the nature and value of SEL in their teaching. The open-ended survey was organized around CASEL's five core competencies of social emotional learning and three questions that were the focus of the common understanding. Each country team worked with high level of autonomy, created additional questions as needed for their cultural, socio-political contexts and provided additional resources at the end of survey.

### 2.2 The Procedure

As an IRN we worked through the zoom platform and from September 2018 to February 2019, we had more than 13 virtual meetings plus more than 15 one-on-one meetings. We had our first in-person meeting in Padova, Italy on June 2019. Fifteen countries have successfully completed the first phase of the project, collecting survey data from educators and analysing the data using a modified grounded theory and NVivo. The group will continue to analyse and compare the data across countries in order to create a SEL measure and professional development strategies as expected in the phase 2 and 3.

### 2.3 Participants

Each country team involved, based on its network and possibilities educators who work in schools and are in charge to provide some kind of career education or related activities. Most of the countries involved teachers. The sample size of the 15 countries varied from 18 to 95.

### 2.4 The Codebook Development

For most of the countries the thematic analyses were run initially paper and pencil.

Nvivo program was also introduced as analytic tool useful to create a coding system for each country and proceed to the comparison across countries. Each country code consists in a list of the code, the definitions produced by the research team for each code, and the best example selected among the answers provided by the educators.

The number of codes/themes ranged from 7 to 131.

### 2.5 Some Preliminary Results

In using NVivo the cluster analysis solution was chosen because it allows to process words similarities. This cluster analysis in fact compares the level of association between educator responses to generate higher level codes.

As concern the comparison across countries, the analysis of correlations shows that the coding system they developed is highly related. US are highly correlated with Turkey,

China, Japan, Romania, Greece. South Africa, Italy and Guatemala emerged as less correlated.

As concern the content, the 5 SEL competences resulted in most of the codes.

Nvivo analyses and group discussions allowed to identify some common codes/themes as well as some themes that are unique to a particular country. As concern the specific codes that were produced, "Empathy" and "communication" are two examples of SEL skills that emerged as important in most countries. The unique themes are better understood referring the social and political contexts of each country.

"Verbalization" emerged from Japanese data could be understand in the cultural importance attributed to reflection or thinking more than acting and in the importance for teachers to teach students to express their feelings with words. In South Africa, it is critical for educators to consider a culture of violence and children at disadvantaged backgrounds. Themes, such as "forgiveness," "free expression," "loss," and "restorative justice," revealed the unique societal situation that South African educators are facing.

In US a unique code is represented by 'technological communication' and underscore the challenges for an advanced IT country.

## 3. Lesson Learned

Involving educators in data collection was hard in many countries especially when SEL is not known. To respect the team group timeline is crucial for the progress of an international project that is not founding. The huge amount of data take time to be understood. The connection between SEL and CD is possible and simpler to understand if we involve educators. We are now working on cross cultural understanding of empathy as well as on a new measure development.

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# Application of Critical Thinking Strategies in Educational Practice of Lower Secondary Education

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## Abstract

*The study analyses the identified teaching strategies for the development of critical thinking and the extent of their use by teachers of lower secondary education in the Slovak Republic. We have identified a significant relationship between the application of individual strategies by teachers and the level of critical thinking regarding the factors, such as interpretation, assumption recognition, deduction, self-regulation and argument evaluation – therefore, this study focuses on whether there is a significant difference in application of strategies for development of critical thinking by teachers. We have identified the level of application of strategies for self-regulation, development of systematic and interpretative skills, strategies for argumentation, drawing conclusions and problem-solving, strategies for evaluation development and development of reading skills in teaching. Based on the results, we found that the application of strategies for development of critical thinking by teachers differs statistically significantly. The most widely used strategies are strategies for developing systematic and interpretative skills (leading to the summary of learning content, application of practices for understanding, identification and definition of basic concepts and relationships by teachers, making notes, using associations, preferring cognitively challenging tasks, encouraging pupils to create original ideas, using categorizations, leading pupils to deduction). Less often used strategies are those aimed at the development of argumentation skills, strategies for drawing conclusions and problem solving, and the least used strategies in teaching are those for the development of assessment and reading skills.*

*Keywords: Critical Thinking, Creative Thinking, Management of Strategies Selection, Teacher's Managerial Competence, Teaching Strategies for Development of Critical Thinking*

## 1. Introduction

Ability to think critically is nowadays considered to be essential for effective way of life in 21th Century. It is a key competence of every individual, which includes abilities creatively and critically solve problems, identify them, analyse, suggest solutions, revaluate them and learn from them.

E. R. Lai [1], implements in definition of the essence of critical thinking these categories: deduction based on inductive or deductive arguments, analysis of arguments, claims or evidence; deduction based on inductive or deductive arguments; review and evaluation; decision-making or solution of problems; answers to clarification questions; definition of terms; identification of hypotheses; explanation; verbal reasoning particularly regarding the phenomenon of probability and uncertainty; prediction; looking at a problem from several points of view; rigorous mental activity aimed at evaluation of arguments or statements for formulation of conclusions.

In an attempt to define the key constructs of critical thinking required for the evaluation of education outcomes, the experts attempted to create a consensual definition that was published in the Delphi Report [2]. The core of critical thinking consists of two dimensions:

1. *specific categories of cognitive capabilities: interpretation, analysis, evaluation, judgment, explanation, self-regulation;*
2. *dimension of personality dispositions*
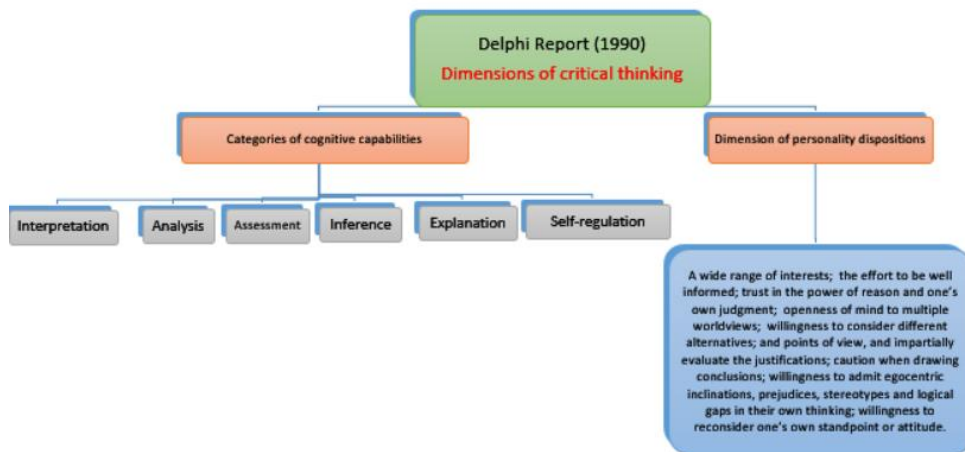


*Fig. 1. Dimension of critical thinking in Delphi Report [2]*

These features as evolving qualities of a personality [3] require effective educational strategies and their expert application. In the teaching profession expertise generated by systematized professional knowledge covers the rationalization and verbalization of hidden or silenced (tacit knowledge) prerequisites for decision-making and action.

Expertise includes the teacher's own theory in a unique situation (for each case a new theory). An expert autonomously selects teaching strategies that ensure the transformation of subject content and brings about a permanent reflection of practical activity and the self-reflection.

As previous researches showed, the level of applying strategies of critical and creative thinking (or the very level of critical and creative thinking) differs regarding the subject, study programs of the education students and also the school type, degree of education [4, 5, 6, 7, 8].

## 2. Strategies for Developing Critical Thinking in the Educational Process

Based on theories of critical thinking [2, 9, 10, 11], and other and operationalized constructs of critical thinking, we have formulated various educational strategies that help to develop individual factors of critical thinking [12]. Through factor analysis, methods and procedures were classified into 6 factors – strategies for developing critical thinking in the teaching process. These are:

*Strategies for Development of Self-regulation* – present mainly strategies for developing personality, volition and emotion connected with critical thinking such as: widening the circle of interests, motivation and stimulation of the need to be well informed, strengthen the trust in the power of reason and one's own judgment, openness of mind towards diverse worldviews, willingness to consider different alternatives and

points of view and without prejudice to consider substantiation, caution in drawing conclusions, willingness to admit egocentric inclinations, prejudices, logical gaps in one's own thinking, willingness to re-evaluate one's own opinion and also the development of metacognitive skills, monitoring and correction of one's own thought processes, identification of emotions, prejudices, stereotypes, cognitive abbreviations, in one's own judgement and argumentation and control of the adequacy of the chosen problem-solving strategy.

*Strategies for Development of Systematic and Interpretive Skills* – present mainly strategies aimed at recognition of a problem, identification of main idea, classification of information in a broad professional text, clear definition of terms, paraphrasing, interpretation of data in tables, graphs, recognition of the meaning of non-verbal signals in communication and so on.

*Argumentation Strategies* – represent procedures leading to the identification and analysis of arguments, determination of relationships and connections, similar and dissimilar characters, recognition of arguments and evidence in an argument, identification of unexpressed assumptions.

*Strategies for Drawing Conclusions and Problems Solutions* – these include mainly procedures leading to the formulation of alternative suggestions to solutions of a problem, prediction of consequences, presentation of conclusions, results, presenting in the form of tables, schemes, creation of models expressing of relations between variables, justification of procedures, methodological approach, formulation of arguments , anticipation of counter-arguments.

*Development Assessment Strategies* – assessment presents the judgement of the reliability of arguments and the quality of the arguments. It also includes judgement of the reliability of the source of information, identification of logical gaps in argumentation, assessing of strengths and weaknesses of alternative theories, judgement of the justifications.

*Strategies for Development of Reading Skills* – we have included mainly strategies based on work with text that led to reading comprehension.

## 3. Methods and Participants

Our research aim was to find out if there exists a significant difference in inclusion of strategies developing critical thinking in teachers of lower secondary education, respectively if some of these strategies are used in educational processes more often.

Targeted group are teachers of lower secondary education.

We hypothesized that there exist statistically considerable differences in application of strategies and methods for development of critical thinking in teachers of lower secondary education.

As part of collecting the data we used a questionnaire Duchovicova, J. [12]. For testing of the hypothesis, we used the non-parametric Friedman ANOVA (0,05).

## 4. Results

For the testing of the hypothesis we used non parametric tests for the individual variables don't show normal divisions, what we checked with normality test- Shapiro-Wilks-W- Test.

| | Friedman ANOVA and Kendall Coeff. of Concordance ANOVA Chi Sqr. (N=125, df=5) = 93,73143 p=,00000 Coeff. of Concordance = ,74985 Aver. rank r=,73943 | | |
|---|---|---|---|
| | average | total | SD |
| B: Strategies for Development of Self-regulation | 1,760000 | 220,0000 | 1,051982 |
| A: Strategies for Development of Systematic and Interpretive Skills. | 1,640000 | 205,0000 | 0,637704 |
| C: Argumentation Strategies | 3,160000 | 395,0000 | 0,943398 |
| D: Strategies for Drawing Conclusions and Problems Solutions. | 4,320000 | 540,0000 | 1,144552 |
| E: Strategies for Development of Assessment. | 4,360000 | 545,0000 | 0,700000 |
| F: Strategies for Development of Reading Skills. | 5,760000 | 720,0000 | 0,597216 |

Table 1. Application of strategies for the development of critical thinking in teaching

Results showed that between the choices or the actual use of the individual methods and strategies for development of critical thinking of students in lessons of lower secondary education teachers are statistically high relevant differences (p=0.0000).
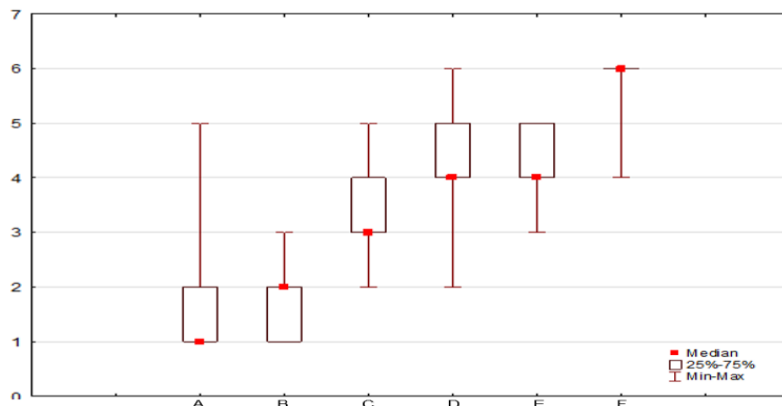
Variable codes: 1 - I always use, 2 - I use it often, 3 - I use it occasionally, 4 - I use it rarely, 5 - I hardly use it, 6 - I don't use it

Fig. 2. Application of strategies for the development of critical thinking in teaching

To measure the consensus between the choices and use of the methods and strategies by the teachers we used the Kendall concordance coefficient, so called Kendall W. The value of W=0.739 shows a strong consensus by choosing methods and strategies in teaching among the teachers that we examined. Based on our findings we can proclaim that the hypothesis about uneven usage of strategies for development of critical thinking in teaching process was confirmed.

As results in the graph show, teachers unambiguously prefer interpretation and self-regulation methods (average 1.64 or 1.76 which means these methods are being used often). Teachers statements show that they often use methods leading students towards deduction, concretization, they use procedures for understanding, remembering, methods leading to summarize and interpret the curriculum.

As we found out, lower secondary education teachers only rarely or almost never use

strategies for drawing conclusions and problem solving, strategies for assessment development and strategies for development of reading skills. Average score for using strategies for development of reading skills leading to development of reading with understanding is very low, what we see as very alarming.

## 5 Conclusions

Effective learning aimed at learning how to think critically gives the individual the best hope for successful life as postulate the key thesis in many documents of declared needs of lifelong education. The aim of modern didactics becomes the need to give the teachers such psycho didactic competences so they will be able to use cognitive oriented teaching and implement adaptive teaching strategies aimed at development of argumentative abilities leading to identification and analysis of arguments, addressing of relations and contexts, similar and different characteristics, identifying claim and evidence in arguments, identifying unstated presumptions.

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# Changes in the System of Pre-Service Computer Science Teachers Training in the Context of Global Digitalization: Mobile Applications both as a Learning Tool for M-learning and a Subject of Study

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## Abstract

*In the framework of global digitalization, we are forming digital society, digital economy, and digital education. Nevertheless, to enable all the members of our society to become freely oriented in the digital space in a short perspective, we must begin to prepare them since the very childhood. For these purposes it is necessary to rebuild school education, paying special attention to those who provide it – schoolteachers. In this paper, one option to improve the system of pre-service computer science teachers training is proposed (since computer science is the most "digital" subject). The author's method described consists in expanding the role of mobile technology and is now being used at Moscow Pedagogical State University (MPSU). It is assumed that the ability to use educational mobile applications both as a learning tool (when implementing mobile learning technology) and the subject of study (the ability to develop such mobile applications that would be of high quality from a technical, didactic, methodological and UX design point of view, as well as to teach students to do this) will help computer science teachers be better prepared for the challenges of the digital society.*

*Keywords: Digitalization, Pre-Service Computer Science Teachers Training, Mobile Learning, Educational Mobile Applications*

## 1. Introduction

For our society to become truly digital, it is necessary to start preparing its members from the very childhood, primarily from school [4], [11]. The content of all school subjects should be reviewed per under the digital society challenges. But first of all, this should be done to computer science as the most "digital" school subject.

As known, one of the most powerful digitization tools is mobile technology. Therefore, the author sees the expansion of its role as one of the most effective ways to improve the educational system in the field of computer science. Digitalization and simplification of access to all information of the world accelerate all processes around. Therefore, all the skills acquired in the learning process should be as applied as possible. This means, for a better understanding, schoolchildren should receive a completed product as one of the learning outcomes. For example, it is good if when learning programming, they not only learn its basic principles, but also put them into practice, by creating application software, such as mobile applications.

Besides, not only the content of educational subjects, but also the teaching technologies do not stand still. For example, mobile learning is becoming an increasingly powerful tool that so successfully complements traditional forms of learning and makes

such learning digital.

Thus, today's schoolchildren should study computer science on the most modern examples and technologies (such as mobile applications development), and this should be done with the most modern educational technologies (such as mobile learning).

Accordingly, computer science teachers should be prepared for the digital society challenges firstly. Which means, according to the author, various aspects of the use of mobile technologies should become one of the directions for improving the system of their training.

## 2. Objectives

In this research work, the following questions are posed:
1. How to prepare pre-service computer science teachers for the digital society challenges faster?
2. How could mobile technology help to solve this problem?
3. What are the advantages of using mobile technologies both as educational tools and the basis of educational technology (mobile learning), and as a subject of study (mobile applications development)?

Thus, the main goal of this research is to improve the pre-service computer science teachers training system by teaching them not only the principles of mobile learning, but also the development of educational mobile applications as well as using them as learning tools.

## 3. Theoretical Background

Many researchers work is devoted to the modernization of current teacher education system by digital society challenges [1], [2], [3], [9]. British scientists J. Traxler, A. Kukulska-Hulme, D. Laurillard pioneered and actively promote mobile learning [10], [12].

German scientists P. Hubwieser, A. Bollin, I. Diethelm pay great attention to the "restructuring" of the school informatics content in connection with digital society needs, and write about the need to improve teachers' digital competencies [8].

At the same time, none of the researchers currently offers any ways to combine the various aspects of the use of mobile technologies as a system in pre-service teachers training. It allows the author to talk about the novelty and relevance of this research work.

## 4. Current Results

Currently, for 2 years now, a system of academic courses developed by the author for pre-service computer science teachers (students getting their undergraduate degree in Pedagogical Sciences with a Computer science major) has been implementing at the Institute of Mathematics and Computer Science of Moscow Pedagogical State University. The system consists of 3 disciplines:
- "Methods of Teaching Computer science" (where one of the sections is "Mobile Learning");
- "Object-Oriented Programming";
- "Educational Mobile Applications".

"Methods of Teaching Computer science" is a compulsory to study discipline, which forms the basis of the educational program on pre-service computer science teachers training. The section on mobile learning has been part of it before and was expanded by the author.

"Object-Oriented Programming" is also a compulsory discipline, since object-oriented programming is a part of the high school computer science program. In author's system, the discipline is improved by the fact that the basics of object-oriented programming are studied through mobile applications development. This means students not only get acquainted with the concepts and purposes of classes, methods and basic principles of object-oriented programming but also learn how to create a completed application software – mobile applications that can later be used in their professional activities (in teaching). Moreover, such students, becoming in-service teachers, will be able to teach schoolchildren the basics of object-oriented programming through the development of mobile applications, which will certainly increase children's motivation and help in educating new digital society members.

"Educational Mobile Applications" is an elective discipline developed by the author, which combines the two previous disciplines in terms of mobile learning, developing and use of mobile applications in education. Studying this discipline, pre-service teachers learn:

1. How to distinguish between learning mobile applications, educational mobile applications and non-educational mobile applications, as well as understand which of them can be used in the learning process at school.
2. How to search and analyse selected applications according to such criteria as content quality, usability and UX design, data security [7].
3. How to design and develop educational mobile applications that meet all the requirements of the educational system, usability, UX design and data security [6].
4. How to use mobile applications as a learning tool, create class notes and present such lessons to classmates, and then to schoolchildren.

As for the results, despite the fact the research work is still ongoing, at the moment, the following points can be distinguished as the results of described system implementation:

1. To date, 10 educational mobile applications developed by students of Moscow Pedagogical State University completed the course system have been published in Google Play mobile application store. In total, more than 50 mobile applications have been developed during this time, but most students would like to test their developments first with schoolchildren, then finalize them and only after share them.
2. Over the past 2 years, more than 15 bachelor's theses at the Institute of Mathematics and Computer Science of Moscow Pedagogical State University have been written on the topic of mobile learning, development or use of educational mobile applications.
3. The author published a school textbook on the basics of mobile applications development "Mobile applications development. First steps" [5], which can be used both in computer science lessons at school and in additional education for schoolchildren.
4. Schoolchildren in 4 Russian schools (where students of Moscow Pedagogical State University who have completed the course system now work) now learn the basics of object-oriented programming through the development of mobile applications.
5. Refresher courses for in-service computer science teachers on this topic are being currently prepared at Moscow Pedagogical State University.

## 5. Conclusion

Thus, the use of mobile technologies as a means of teaching and a subject of study has already been included in pre-service computer science teacher training system at Moscow Pedagogical State University. As a result, it is possible to get more motivated schoolchildren and more prepared for the digital society challenges computer science teachers which is essential in the age of global digitalization.

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# Rapid Shifts Require Rapid Response:
# Taking Action as the World's Schools Shut Down

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## Abstract

*As the beginning weeks of 'lockdown' unfolded in Italy, my concern was for families facing endless hours trying to keep their children busy. After all, most parents are not trained teachers and most family members do not usually spend so much time together. The horror of COVID-19 in Italy tore at my heart – as an educator of Italian descent. My husband and I, who teach at the university level, had previously conducted research in Italian schools in Rome, Valle D'Aosta, Marano sul Panaro, and have been engaged with the Contrada della Selva (Siena) for several years. We thought of these families, teachers, and children, with whom we had built personal and professional relationships. How would parents cope with being home from their jobs, having their children with them, while facing their own fears and concerns for their loved ones, work, and the logistics of this rapid shift in their lives? I brainstormed strategies to create a daily blog to electronically reach communities in Italy, a resource of read aloud and craft activities for families to do together, or just by children. However, COVID-19 crossed the ocean and within hours, our own city and university shut down. While my initial target audience changed, postings could also help any community. This session addresses how an idea to help those impacted by quarantine emerged into an international effort for families across the globe. One of the biggest obstacles, however, has been getting the word out to share the resources with those who could benefit most.*

*Keywords: COVID-19, literacy, learning activities, educational resources*

## 1. Introduction

As an educator of Italian descent, I watched the news as COVID-19 ravaged Italy.

During the beginning weeks of 'stay at home' unfolding there, I wondered about the families facing endless hours together. Even considering the rapid transition to lessons being presented on line, the majority of each day in home isolation would not be spent doing schoolwork. How would parents keep their children busy for the rest of the day and evening?

My husband and I teach at the university level and have previously conducted research in Italian schools (Rome, Valle D'Aosta, Marano sul Panaro) and have been engaged with Contrada della Selva (Siena) for several years. I thought of the families, teachers, and children with whom we had built personal and professional relationships.

How could I help from almost 5,000 miles away? I brainstormed ideas and decided to create a Blog of simple recreational activities they could easily access.

As I planned the next moves, our own university closed, as did our local schools.

Within two days, the entire state of Georgia (and most of the USA) closed for all but essential workers. My plan for Italy quickly changed to include our local communities.

The blog could be accessed by anyone who knew about it. This story is not unusual

in a time of crisis, but one of thousands of ways people across the globe have tried to help one another.

## 1.2 The Original Plan

I created a daily blog (**The ReaDing Rhinoceros Resources**) to electronically reach our colleagues in Italy. The plan was to invite friends there to share with their friends, schools, and anyone who might be interested in children's literature and related activities. For read aloud videos of simple American children's books, I would show the text, so Italians, who are learning English, could hear and see the words and illustrations to help comprehension. I crafted activities related to the books, for families to do together or just by children. I recruited my husband, an artist, to create simple step-by-step drawing videos to coordinate with poems, crafts, songs, and games, that children could follow. I began the technology part, using *Blogger*, a blog-publishing service I have used in the past [1].

## 2. Rapid Shifts

The location of our university serves two surrounding school districts: Lowndes County and Valdosta City Schools. These, as well as school districts across the state, were impacted by the following announcement: "On Thursday, March 12…Governor Brian Kemp [Georgia, USA] addressed the state's growing concerns [about COVID-19] by allowing school districts to close for up to 14 days. After careful thought and consideration, Lowndes County Schools has decided to close our school district effective Monday, March 16 through at least Friday, March 27. Our school district remains hyper-focused on your health and safety and will continue monitoring and sharing information about the developing situation with COVID-19. Should there be a need to extend the closure we will communicate that message with our community." [2]

"While Valdosta City Schools is closed during the coronavirus pandemic, COVID-19, we are unable to offer online learning options and/or direct educational services to the general student population. At this time, we cannot ensure all students and staff will have equal or equitable access to home Internet connection, an online learning system, and/or devices to access full online learning options. In addition, unfortunately, our district does not have an online learning system to effectively provide instruction and one-on-one support for students with disabilities. Please continue to encourage students to stay engaged in learning during the school closure. Students can read every day and access VCS Home Learning Resources. Free educational resources, updates, and suggestions for home learning are posted below." [3]

The next day, March 13, 2020, President Donald Trump's declaration of a national emergency resulted in the US Department of Defense to recommend the closing of all school buildings for the remainder of the academic year [4]. This in essence, would keep more than 55 million school-aged children (Pre-K through grade 12) at home in the United States [5].

## 2.1 Required: Rapid Response

A quote by noted psychologist, Angela Duckworth, came to mind: "Perseverance is essential to achieving our goals, but passion is paramount to identifying goals in the first place." [6]. I had the passion, but as we suddenly had to move our own coursework to an online format, could the perseverance be maintained? Walker (2020) reports the closing of schools impacted teachers who wanted to get it right, many of whom had never taught on line before, were new to technology used by their school districts, and instantly, not only found themselves dealing with their own families and concerns for safety, but

had to provide emotional and social support for their students [7], [8].

### 2.2 Taking Action as the World's Schools Shut Down

The whole world was trying to find ways to engage students remotely [8]. Although this blog was more recreational, I realized that there was a huge disparity, not only in our county, but throughout the US regarding access to the internet and availability of devices.

When I was creating for our Italian audience, I was pretty sure everyone would have access. Here, the divide was huge [9], [10].

When I created activities, I tried to imagine materials families might already have available: empty boxes, markers and crayons, even toilet paper rolls. Directions for activities were simple with photos and videos where possible. My goal was to post something every day that could be completed at any time, (except a few related to Mother's Day and spring). This, I thought, provided optimum opportunities for audience engagement.

### 2.3 Blogging: Frequency, Variety, and Simplicity

Initially, as the university suspended classes, it was necessary to provide resources my pre-service teachers could utilize to complete existing and revised course assignments. This is where the "resources" part was added. For example, there was an upcoming reading log, but bookstores and libraries were closed. I compiled a list of book resource sites (like *Vooks* [11]) to provide access for anyone using the blog, while meeting the needs of my students.

Activities included virtual field trips, author homepages, videos about art, science, math, geography, art, music, and movement, crafts, and of course, literacy. Since April is Poetry Month, a children's poem became easy daily posts.

### 2.4 Sharing: Getting the Word Out

The first group to access the blog was my pre-service teachers. I provided resources they would need. I asked them to click FOLLOW, to enable receiving updates as I made them. Then I asked them to share the blog with their mentor teachers, practicum students, teacher friends, and anyone they knew with young children.

Due to IRB regulations, I was not able to use my university students' work as blog entries. I sent emails and Facebook messages to as many former students and teacher friends, asking them to share, as well (https:ReadingRhinoceros.blogspot.com). I solicited friends to create activities that I could post, giving them credit, as well. But teachers were also facing overnight changes to preparing lessons on line, while caring for their own families. I shared every opportunity I had. But the response was still very low.

## 3. Conclusions

The blog posts are always available. As an educator, I am very aware of the "summer learning loss" and the idea of this project was to provide engaging activities to keep children thinking creatively. Perhaps having this resource, might lessen the summer slump [12].

The hardest part was keeping ahead, to be sure there was a posting for every day.

*Blogger* gives the option to set publication for a specific date, so when I caught up with my own schoolwork, I created posts, ready to go "live" on a given day. At times, keeping up was difficult, but I am into a routine now and hope to keep posting entries throughout the summer.

My Italian speaking and writing skills are not strong enough to have created in Italian.

I relied on a professor friend to edit my *Introduction for Italian Families* before I posted it. A speech pathologist friend in Siena was willing to secure the contrada's permission to share and provided the link to the group. My attempts to explain to two other Italian mayors met with appreciation, but I am unsure of the actual usage by these Italian communities.

A creative team would have been very helpful, especially in the early days of getting the blog up and running. I will appeal again to my teacher friends and former students to create a few postings, for which I will recognize their service in a letter or certificate. Their contributions would definitely help build this resource. My plan is to reach out to my contacts once again, asking to share the blog.

A personal thanks to my husband, my #1 supporter and to the friends who have contributed posts. We all need to thank our teachers. Is it ironic that Teacher Appreciation week occurred during the pandemic? I think families and the general public have a new (and long overdue) respect for what teachers do. https://www.usatoday.com/story/news/education/2020/05/04/teacher-appreciation-week-2020-coronavirus-virtual/3066238001/. [13]

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# Teachers' Professional Skills and Competencies: What Are the Most Important?

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## Abstract

*The aim of this research is to investigate teachers' professional skills and competencies through a self-reflection and self-evaluation approach using a framework-syllabus developed inside a specific multi-professional research project. To favour the construction of a high-quality framework for this study, a heterogeneous team of 15 users with complementary competencies was involved in the development (educational researchers, school principals-head teachers, teachers of all grades) of a framework based on Italian and international professional standards. In this work I present the preliminary result of a pilot study that has investigated the perception of importance of a group of practitioners referring to the framework-syllabus of skills and competencies that each "expert teacher" should master in order to meet the requirements of the teaching profession. To do this, I grouped the most relevant competencies in an online syllabus framework-tool. It was structured in 3 macro-areas (professional, teaching and organizing) and 16 competencies expressed in 77 different behavioural indicators (how demonstrate the indicator in her/his practice). The teachers' opinion on professional competencies were investigated through a self-reflection and self-evaluation/assessment approach. The tool created for the purpose, implemented and used by the participants, was an online questionnaire. The results showed the order in importance assigned to the 16 competencies (from most important=1 to less important=16). The order illustrates the particular emphasis placed on the ethical aspects related to the profession, continuous learning/innovation, leadership role and inclusive approaches for all the students. A particular focus emerged in connection to the strategic role of relationships and collaboration; this aspect was strengthened by a specific item were the participants underlined the great importance of team work. These preliminary results indicate that professional evaluation standards provide educational evaluation knowledge that teachers can use to acquire the working experience they use in their profession.*

*Keywords: Teachers' professional development; skills; competencies; self-perception*

## 1. Introduction

Being a teacher at any level requires a significant amount not only of knowledge, but cross skills and competencies, too [1], [2], [3], [6]. Paying attention to the core competencies for teachers helps to ensure that all teachers are prepared to make school efficient and effective, reaching the standards that are recommended for being a qualified teacher [4], [6]. Teachers need to have competencies and skills necessary to create a positive classroom/school environment and work collaboratively with other stakeholders within and outside the school context in order to provide a successful support to all learners [4].

The recognition of specific standards for the teaching profession based on characterizing skills is a necessary process in order to foster a school vision in accordance with the change that school is experiencing [2], [5], [6].

In this pilot research we have examined teachers' opinion referring to a syllabus of professional skills and competencies. The syllabus is a framework that identifies and describes the skills of expert teachers in all their roles [1], [4]. It is a fundamental tool for a training process consistent with the teaching profiles, both to guide the to-become teachers entering in service, and to provide the in-service teachers with a system of self-perception and evaluation of their skills [4].

According to the national Italian standards and international literature [1], [2], [3], [5], [6] we aggregated the skills and competencies in a specific framework-syllabus. The teachers' opinion on professional skills and competencies were investigated through a self-reflection and self-evaluation approach using this framework-syllabus.

In fact, we believe that self-evaluation of their own professional competence is firstly an exercise of introspection and a helpful occasion for the teachers for deeply reflect on their professional effectiveness and practices. It is an occasion to analyse not only what a teacher has "to do", but firstly what he has "to be" for becoming an expert teacher.

Finding specific moments dedicated to self-reflection and self-evaluation is a significant part of teachers' practice. In this way it is an important need to find these specific moments in order to regularly monitor and evaluate the quality of their work and professional activities. Furthermore, teacher's self-evaluation significantly adds up to monitoring their work also for guarantee teaching quality for all the students.

Teachers can take this self-assessment to determine how they exhibit these foundational and advanced competencies and identify strengths and areas of growth [4].

The aim of these work is to present the preliminary result of a pilot study that has investigated the perception of importance of a group of practitioners referring to a framework-syllabus of skills and competencies that each "expert teacher" should master in order to full fill what the teaching profession request.

## 2. Methods

### 2.1 Participants

This pilot study involved 207 in-service Italian school teachers (Primary school=123; Secondary-first grade=51; Secondary-second grade=33). The main part of them (n=116) had a professional in-service experience from 6 to 20 years.

### 2.2 Procedures

According to the literature about professional standards presented above, we aggregated the most relevant competencies in an online tool representing a framework-syllabus.

To favour the construction of a high-quality framework to be used, a heterogeneous team of 15 users having complementary competencies was involved in its development/review (educational researchers, school principals-head teachers, teachers of all grades).

It was structured in 3 macro-areas and 16 competencies explained in 77 different behavioural indicators (how demonstrate the indicator in her/his practice):

 1.  *Area of professional competencies:*
Practice professional ethic;
Manage relationships/leadership;
Life-long learning/continuous training/innovation;

Problem solving;
ICT-digital competencies;
Use of English language (L2) as professional instrument.

2.  *Area of teaching competencies:*
Teaching-learning/didactical planning;
Enhance talent/educational guidance;
Organizing educational resources;
Inclusion;
Handle class/groups;
Students' observation/assessment;
Evaluate the effectiveness of didactical interventions.

3.  *Area of organizing competencies:*
Collaboration/team working;
Design/evaluate the school participation-system improvement;
Handle/accompanying school's change.

In order to give a more useful representation, the competencies were assigned and aggregated into four different profiles of "expert teacher":

1.  Innovative and inclusive teaching;
2.  School organization: integrated learning environments and processes for quality improvement;
3.  Continuing professional development;
4.  Guidance in education, training and relationships between school and society.

In each profile the competencies have been "weighed" in different way, according to the importance in relationship to the different profiles.

At the end of the self-evaluation through the online tool, the user receives as output, a percentage of correspondence between the grade of competencies declared (self-perception) and the grade expected for each different profile. The results are also showed with a graphical view of the single 16 competencies ("radar chart" and/or histogram).

### *2.3 Data Collection and Analysis*

The teachers' opinion on professional competencies were investigated through a self-reflection and self-evaluation/assessment approach. The tool created for the purpose, implemented and used by the participants was an online questionnaire structured in 77 different items/behaviours referring to the 16 competencies.

Each item was self-evaluated through a frequency scale Likert-type based on 5-degree where participants should choose/assigning a rating from 1=never to 1=always.

In the present state of the research we have collected and analysed some quantitative data (calculation of the percentage in terms of frequency).

## 3. Results and Conclusions

The results showed that teachers recognized themselves in Profile 1 (60%), the one that is most referred to education and innovation in teaching-learning processes. In this way it is interest to report the order of importance given to the 16 competencies (from most important=1 to less important=16)

1.  Practice professional ethic
2.  Life-long learning/innovation
3.  Manage relationships/leadership
4.  Inclusion
5.  Collaboration/team working
6.  Problem solving
7.  Handle class/groups
8.  Enhance talent/educational guidance
9.  Teaching-learning/didactical planning
10. Organizing educational resources
11. Evaluate the effectiveness of actions and didactical interventions
12. Design/evaluate the school's system improvement
13. Students' observation/assessment
14. Handle/accompanying school's change
15. ICT-digital competencies
16. Use of English language (L2).

This order illustrates the particular emphasis given to ethic aspects related to profession, continuous learning/innovation, leadership role and inclusive approach for all the students.

A particular focus emerged referring to the strategic role of relationships and collaboration; this aspect was strengthened by a specific item were the participants underlined the extremely importance of team working (62%).

Referring specifically to the online tool usability, the participants found clear (35%) and extremely clear (28%) the comprehensibility of items and the graphic-results representation (clear 26%; extremely clear 35%).

The completeness of competencies was evaluated representative (32%) and very representative (36%), the same for the behavioural indicators (representative 35%; very representative 36%).

These preliminary results indicate that professional evaluation standards provide educational evaluation knowledge that teachers can use to acquire the working experience they use in their profession. It is fundamental that teachers conduct self-evaluations and use the results for reflecting on their daily teaching practice.

In the future, we hope that the competencies development for the teacher could evolve in competencies for the whole school staff. In this perspective, the school will therefor benefit from a solid team, in which the skills of the various profiles are all properly developed and well represented.

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# Teaching in the Time of Corona Crisis: A Study of Norwegian Teachers' Transition into Digital Teaching

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## Abstract

*Spring 2020 was quite different than most people could have imagined. Schools around the world have been temporarily closed, and most students have had home-schooling. How have these measures affected teaching and learning? What experiences have teachers gained during the corona period? This study is based on a survey conducted among Norwegian teachers during late April 2020. The findings indicate that teachers have generally mastered the digital transition. Many teachers reported more confidence with digital tools, which they are going integrate into their regular teaching practice. At the same time, some expressed the need for a break from the digital ways of working and looked forward to meeting students physically. The teachers used a variety of digital tools, and the majority said they did live lessons daily by video communication. At the same time, some claimed that using digital tools in teaching requires more preparation and better classroom management than without such tools. The teachers believed that students were generally performing as normal or slightly less than normal during the period of home-schooling. Conversely, some teachers also claimed to notice positive progress among students who usually did not excel as much in the classroom. When asked what competence-raising measures have been most useful for their digital practice during the corona period, most teachers reported their own "trial and error", but quite a few also stated that guidance from a colleague or ICT advisor at their school had been useful. Fewer expressed to have taken formal ICT courses that came in handy. Overall, teachers in this study seem to have mastered the transition into digital teaching in the time of the corona crisis without any major challenges.*

*Keywords: teaching methods, professional digital competence, digital transition, corona crisis*

## 1. Introduction

This paper presents some preliminary results from a survey conducted among Norwegian teachers during the period of home-schooling. The purpose of the study was to gain insight into the teachers' digital practices and to learn more about the challenges and opportunities they experienced with digital home-schooling.

### 1.1 Corona Measures for Norwegian schools

The national authorities decided to close schools and other educational institutions from 13th March 2020 [1]. Schools were gradually reopened from 27th April, for grades 1-4 in primary schools and grades 12-13 vocational studies. The other grades went back to school between 11-15th May [2]. Many schools have practiced alternative solutions after reopening, such as a combination of ordinary school, home-schooling, and outdoor activities. For the majority of the schools, the school year ends by 19th June.

## 2. Method

The survey was conducted by SINTEF Digital in late April 2020, during the sixth and seventh week of home-schooling. It was distributed openly via the internet and social media. Also, it was sent to a geographically dispersed sample of Norwegian municipalities with a request to share it internally. An internet survey has some uncertainties. However, this was arguably the most effective way to reach teachers during the home-schooling period. Like the rest of the population, most teachers are online, especially during the period of digital home-schooling. An example is a Facebook group established for teachers to share ideas and resources, which gained more than 60,000 members in a matter of days.

Since this was mainly an open internet survey, teachers were asked to leave their job email as an attempt to ensure that the respondents are reliable. The gross sample is 949 respondents, while the net sample used in this paper is 930 respondents. The respondents are teachers in primary and secondary schools, grades 1-13, with all regions represented. The data collection has been approved by NSD – Norwegian Centre for Research Data.

## 3. Results

The following is a brief description of preliminary results from parts of the survey.

### 3.1 Digital Tools and Assignments

The teachers were asked: Which of the following digital resources do you use during this period?

Those who did not teach every day, but used the resources on the days they taught, could tick off for 'daily'.
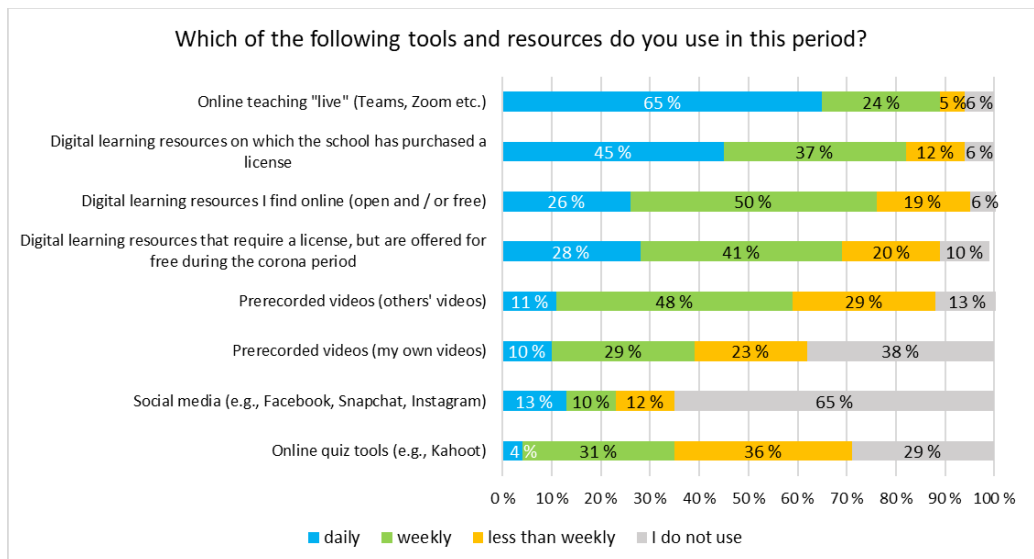


*Fig. 1. How often teachers use different digital tools and resources during the period of home-schooling. (n=930)*

Sixty-five percent of the teachers have done online live lessons on a daily basis, while twenty-four percent have done this weekly. The survey does not say something about the quality, content, or length of the live lessons. The range can vary from a complete one-hour lecture, to a few minutes just to 'meet and greet' before students are left alone with their assignments – or a mixture of these. As figure 1 shows, most teachers have used digital learning resources on which schools have bought licenses. This is positive when considering privacy issues. Almost as many, three out of four teachers, have used other digital learning resources they found online. Many EdTech companies offered free access to their learning resources during the home-schooling period, and nearly seven out of ten teachers say they used such resources daily or weekly. Four out of ten teachers frequently used their own pre-recorded videos, while six out of ten used videos pre-recorded by others. One of three teachers used online quiz tools weekly or more often, while less than one out of four used social media when interacting with their students weekly or daily. Most teachers have other means to communicate with their students, i.e., a learning management system.

### 3.2 Preparation and 'Classroom Management'

Teachers were asked the consider five statements related to the use of digital resources in teaching, compared with the use of non-digital resources. Results in Figure 2.
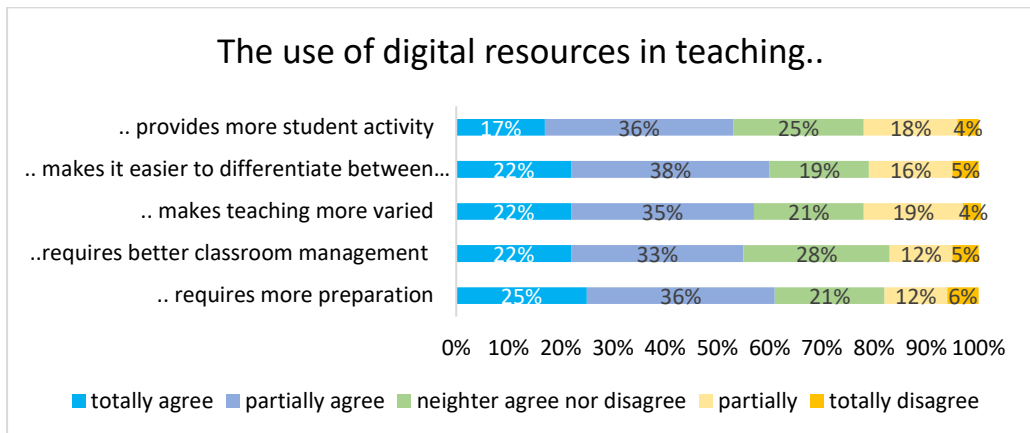


Fig. 2. *Proportion of teachers that agreed or disagreed with the statements. (n=930)*

Six out of ten teachers partially or totally agreed that the use of digital resources when teaching requires more preparation than without them. Almost as many, fifty-five percent, agreed that it requires better classroom management. However, fifty-seven percent also agreed that using such resources makes teaching more varied, while twenty-three percent disagreed. Half of the teachers believed that using digital resources in teaching provides more student activity. Even more, six out of ten agreed that using digital tools makes it easier to differentiate between students. A relatively high proportion of were neutral when faced with these statements. A significant, but not too high proportion partially disagreed, while few totally disagreed with the statements.

### 3.3 Assessment of Students' Performance

The teachers were asked to do an assessment of the overall performance of their students during this period, compared to normal circumstances.
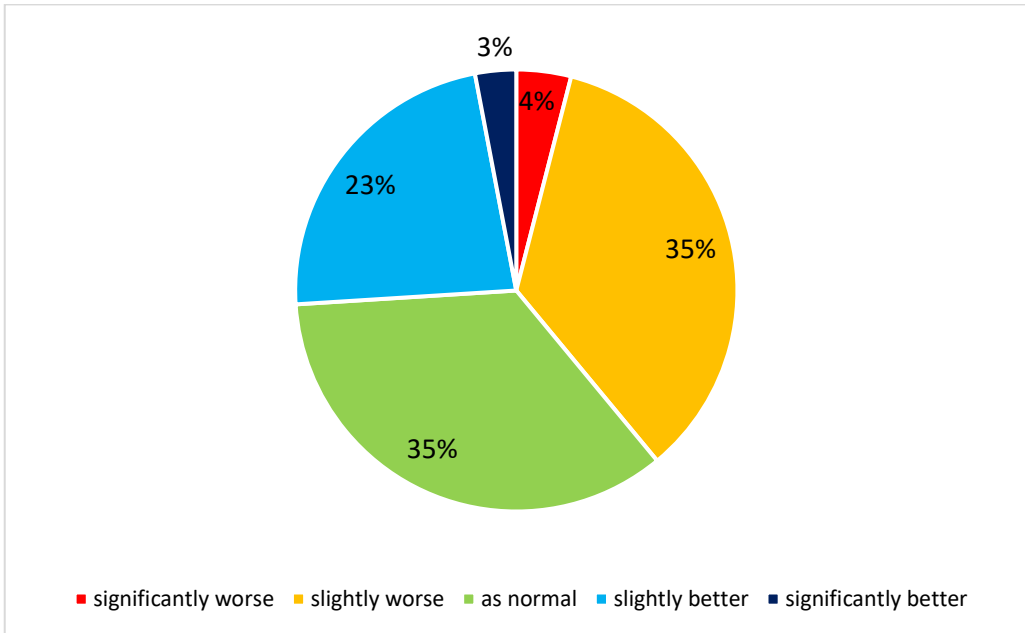
*Fig. 3. Teachers' assessments of pupils' academic progression in home-schooling compared to normal school/teaching. (n=930)*

As you can see in figure 3, thirty-five percent believed that their students have performed as normal. An equal number believed that the students have performed slightly worse than normal. What is more surprising is that twenty-three percent believed that their students performed slightly better than normal.

Some teachers have also commented in the open text question, that students who usually do not excel as much in the classroom have 'blossomed' during the period of home-schooling. The noticeable improvement of a few students might have influenced the teachers' overall impression.

### 3.4 Teachers' Digital Competence

Which role has different measures for improving teachers' professional digital development played during the period of home-schooling? To find out more about this, they were asked: *To what extent have you benefited from these various methods of digital skills development during this period (i.e., previous courses and training programs)?* The response options were given in a five-point Likert scale: to a very large extent, to a large extent, to some extent, to a small extent, to a very small extent, and in addition, don't know/not applicable.

None of the respondents used the extremes of the scale, so these are omitted in Figure 4.
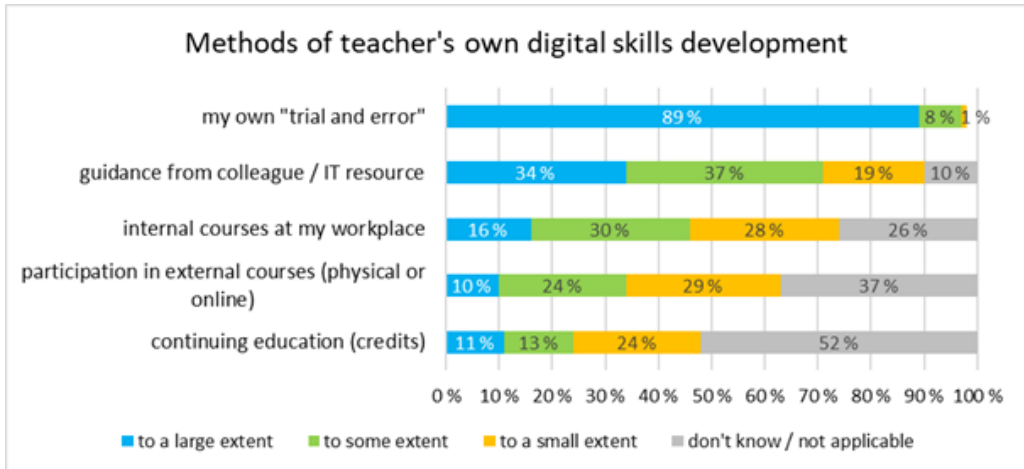
*Fig. 4. To what extent teachers have benefited from pre-corona digital skills development (n=930)*

Figure 4 does not show how many teachers have completed different courses, but whether they believed such measures have been beneficial. The majority believed that their own 'trial and error' have been most beneficial for their transition into digital home-schooling. More than seven out of ten teachers also believed that they, to some extent or a large extent, have benefited from guidance from a colleague or an ICT resource person. A mentionable proportion also agreed that participation in internal and external courses have been useful, but more than half believed this has not been beneficial or was not applicable. One out of four teachers believed that they, to some extent or a large extent, have benefited from previous formal credit courses. During the last few years, there have been several initiatives to offer teachers professional courses in digital literacy [3]. How many of the respondents that have completed such courses is unknown, but half of the respondents answered 'don't know/not applicable'.

### 3.5 Open Question Feedback

The last question of the survey was open for the respondents to share other comments and thoughts: *Do you have any other comments or experiences you want to share? (E.g., positive/negative experiences, skills, and methods you want to use more when the school reopens).* Several teachers reported that they have become more confident with several digital tools, which they are going integrate into their regular teaching practice. At the same time, some expressed the need for a break from the digital ways of working and look forward to meeting students physically. Several pointed to challenges for some students related to age, social background, and general home situation. Conversely, some teachers also claimed to notice positive progress among students who usually did not excel as much in the classroom.

About forty percent of respondents answered the open question, which leaves 365 free-text responses to be analysed. At the moment, this is not fully completed. Therefore, I would like to emphasize that all this should be considered as preliminary findings.

### 4. Discussion

Almost nine out of ten teachers said they did online live teaching daily or weekly, but quality, content, and duration is unknown. Also, this might differ between school levels

and grades. Findings from other research on home-schooling in the same period suggest that primary school students have had too little contact with their teachers [4]. A quick look at the numbers in this survey shows that fifty-five percent of the teachers in grades 1-4 had online live sessions daily, twenty-nine percent weekly, and nine percent never.

Whether this is enough or not depends on the content, context, and the various needs of students and their parents.

Overall, more teachers used others' pre-recorded videos than making their own. This might be a matter of own digital shyness. However, there are millions of tutoring videos online, so it is no surprise that many choose to use what is already made. Also, six out of ten teachers agreed that using digital resources requires more preparation than without them, and more than half believed that it requires better classroom management.

The teachers in this study believed that students were generally performing as normal or slightly less than normal during the period of home-schooling, but as many as twenty-three percent also believed that students were performing slightly better. Some teachers commented that students who usually did not excel as much in the classroom had 'blossomed' during this period. The noticeable improvement of a few students might have influenced the teachers' overall impression. However, six out of ten agreed that using digital resources makes it easier to differentiate between the students – which could be beneficial for students' performance.

Teachers' professional digital literacy has been a missing link in teacher education, something which has affected their pedagogical and didactical understanding of digital tools [5], [6]. As a result, many teachers have to rely on their 'trial and error' approach to develop digital skills and literacy. This corresponds to the findings in figure 4 and with previous research [7]. In a national survey on digital practices in K-12 education, more than eight out of ten teachers considered didactics to be the crucial factor for using digital resources in teaching [7]. For the last few years, both national authorities and teacher training institutions have done measures for the development of teacher's professional digital literacy, i.e., the Professional Digital Competence Framework for Teachers [8], and by offering specific continuing education in digital literacy [3]. The results might be noticeable in a few years. However, I am sure that teachers also can benefit from their own hands-on experiences from spring 2020. Authorities, teacher training institutions, and school leaders must build on the emerging digital confidence that many teachers seem to have gained. Moreover, it is time to focus on didactics rather than the technical part of using digital tools.

## 5. Conclusion and Future Work

The overall impression of the teachers participating in this study is that they have mastered the transition into digital teaching without any major challenges. This, despite the short notification of schools closing and other abnormal circumstances due to the coronavirus.

The complete findings of this study should be analysed more carefully and included as part of a broader context of research on home-schooling. Also, the study could contribute to reflecting on classroom practices in the 21st century.

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# Teaching Practice in Pre-Service Language Teacher Education: Challenges of the Transition from Face-to-Face to Online Lessons

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## Abstract

*The paper concerns pre-service teacher training within a post-degree program in teaching Italian as a foreign language at the University for Foreigners of Perugia. As existing literature suggests, coursework alone may lead to theoretical knowledge about teaching, but not to the day-to-day active understandings that teachers use in their classroom. Without the opportunity for practice, teachers may find themselves unprepared for the realities of language teaching. Therefore, the post-degree program traditionally combines theoretical knowledge and practical knowledge in a blended instruction: 7 months interactive online coursework (including an introduction to computer-assisted learning) and 2 months face-to-face training. However, there are cases where face-to-face training experience is difficult or impossible to accomplish (like during the recent Covid-19 outbreak). In this setting the authentic teaching context that allows practice for pre-service teachers can be provided by an online language course. Consequently, teacher education in computer-assisted language learning becomes a central aspect of the training and it can constitute an example of good practice for the present cadre of Italian language teachers in training. The paper describes the evolution of the course through its transition from a face-to-face to online context, the challenges in its planning, preparation and implementation, as well as the first results of the new online edition and suggests innovative solutions for the design and management of similar training courses.*

*Keywords: teacher education, pre-service teacher training, teacher learning in CALL, distance learning, social constructivist perspective, synchronous learning management systems*

## 1. Pre-service Language Teacher Training

The aim of this study is to present the model of pre-service teacher training adopted in a first level Master course in Teaching Italian as a foreign language at the University for Foreigners of Perugia. The Master specializes Italian and foreign graduates in Italian, to work in Italy and abroad, teaching Italian to students whose first language is not Italian.

The presentation of the teacher training of the Master course allows both for describing a successful model of teacher-learning developed over the years and for evaluating the role of teaching practice in language teacher education, as well as for underlying challenges and difficulties in its realization online. The Master course has been taught since 2004 and has trained around 670 native and non-native Italian speakers from around the world in the field of language education. Students taking the course come from varied backgrounds and experience in teaching, from no teaching experience at all, to those who are currently teaching Italian or other foreign languages.

Distance education and online learning are both a theoretical and a practical component of the course, levelling somehow the individual differences in knowledge about computer assisted learning. The approach and the methodology that has been the foundation of the efficiency of the course has remained the same since the first edition.

Informed by a social constructivist perspective on learning [1], the course's pillars continue to be interaction and collaboration, combining different pedagogical tools including distance learning activities, delivered through an e-learning platform, assisted with constant interaction between students and tutors and face-to-face educational activities, consisting in lessons, seminars, workshop activities and a monitored internship called Practicum.

Traditionally, most teacher education programs have assumed that teachers can learn everything they need to teach well by completing their programs of study, with limited opportunities for practicing, often equated with passive observation of lessons taught by expert professionals. However, as Egbert [2] states, teachers from these programs might find themselves unprepared for the realities of language teaching and feel stressed and confused once they assume an instructional role and have to apply what they have learned to a culturally situated context. It is thought advisable to include experiential learning, such as internships, in teacher education programs in order to integrate knowledge and theory with practical application and skills. Internship is a controlled work experience, with less pressure and risks compared to the real-life context, that allows learners to apply theoretical knowledge in a practical setting and to gain practical and professional skills [3]. Furthermore, it gives the pre-service teacher the opportunity to engage in reflective practice (see §2). Thanks to the practical experience, trainee teachers can learn how to act efficiently in the working context and they can identify their own professional potential and limits. In fact, there is a rich evidence suggesting that internship is one of the most important and influential parts of pre-service second language teacher education and specific benefits are reported in a growing body of empirical studies [4]. As far as our Master course is concerned, from the analysis of the 86 participants' evaluation questionnaire referring to previous academic years (2016/17 and 2017/18) the Practicum appears as the "heart" of the course and many of the participants suggest longer practical teaching periods. The three main strengths they underline are the opportunity to put theory into practice, the cooperative work within the group and the utility of feedback they receive from tutors and peers.

## 2. Teaching Practice in a Learning Community

Different models of professional experience for language teachers have been implemented around the world. The choice of the model in the Master course is based on the conviction that a circular relationship between theory and practice is essential to develop knowledge and that communities of practice must constitute the core of professional learning for teachers. The main objective of the 2-month Practicum is to strengthen knowledge and basic competences in teaching L2 Italian learned during the 7-month online part of the course. To give an example, in the online part students follow a module about developing teaching materials from authentic texts and during the Practicum they put into practice the skills they have acquired, creating teaching materials for an entire language course. The specific learning objectives of the Practicum include 1) know how to plan an Italian language course for foreigners, taking into account learners' needs and competence; 2) be able to select texts coherently with the level of competence; 3) be able to choose and implement methodologies and teaching techniques coherently with learners' needs; 4) develop ability to reflect critically about

his/her own methodological choices and about his/her own and others' teaching actions; 5) develop classroom management skills; 6) be able to assess language learners' knowledge and competence.

The Practicum, which is the strength of this specialization course, is characterized by two phases: the first is guided observation of Italian language lessons at the University of Foreigners of Perugia; the second is monitored teaching practice in specially formed classes of foreign students. During the monitored teaching practice, in small groups (4-6 people), trainee teachers develop the syllabus of a course, lesson plans and create teaching materials based on authentic texts. Trainee teachers are followed by teacher-tutors who encourage collaboration and sharing knowledge between the members of the group. There is a moment where trainee teachers can test themselves individually: each participant teaches at least two language lessons to a class of foreign students. At the end of each lesson the group and the tutor come together to give a feedback to the colleague who taught the lesson. One or both of the lessons are filmed and they become a further occasion for exchange. The individual component is evaluated, but collaborative work with peers and tutors has a much higher value in the course. In fact, the aim is to develop a learning community, where members rely on one another to learn and progress.

Furthermore, trainee teachers are constantly asked to reflect upon what they have learned, what they want to experiment and what they have experimented, via the interchange with their tutor and peers, the feedback and the final discussion about the video recorded lessons (see Fig. 1). In this way all participants become "critical friends", giving each other advice as a trusted "friend" rather than a consultant, in a sympathetic but constructively critical way [5].
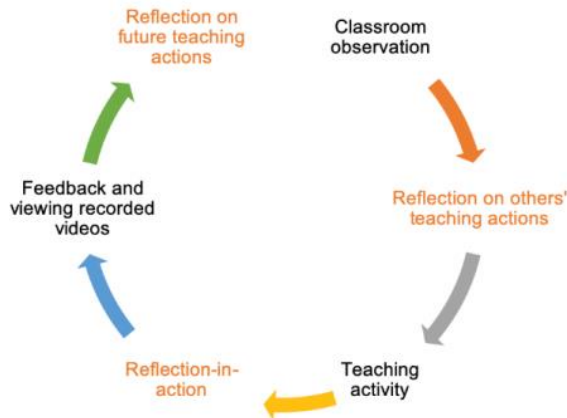


*Fig. 1. Reflective practice during the Practicum*

Reflective practice has an important role in the educational path because one of the main objectives of the Master is to develop teacher's propensity for a critical attitude allowing them to reflect upon others' and his/her own teaching practice. This ability is considered in the final assessment, as in the Practicum alongside lesson plans and their implementation, the active participation in discussions (feedback) and a report on observations in the classroom are also evaluated (see Fig. 2).
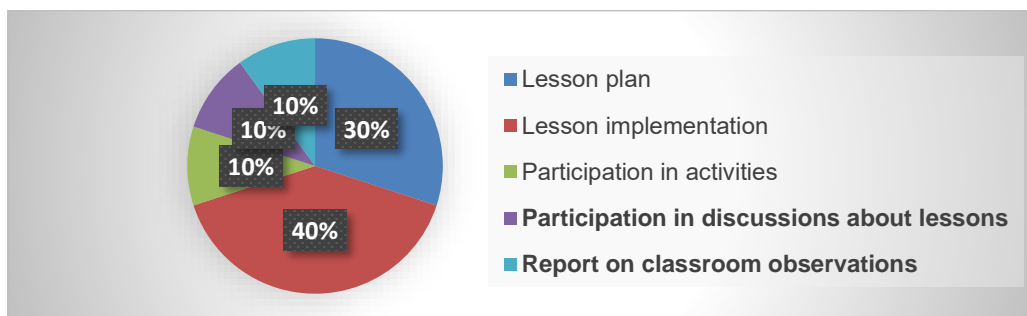
*Fig. 2. Evaluation of the Practicum*

The activities of the Practicum are monitored by means of various tools. Trainee teachers fill in a questionnaire about their needs and expectations at the beginning of the Practicum and a semi-structured evaluation questionnaire at the end. Teacher-tutors are also asked to fill in a survey composed of open-ended questions. Monitoring and evaluation of activities allow for taking appropriate decisions aimed at improving the effectiveness of the training course. In fact, in order to realize an efficient internship a good course design is not sufficient: great efforts are required in its management, in its evaluation and in its eventual reorganization.

## 3. Professional Experience in a Synchronous Computer-Mediated Context

In the 16th edition of the Master course, due to the Covid-19 outbreak, the course had to be transformed from the mixed format to a fully online format. In this setting the authentic teaching context is provided by an online language course organized with the support of Microsoft Teams and classroom observations are carried out by watching videos recorded online and face-to-face classes. The structure of activities and evaluation criteria remained unvaried, while some of the learning objectives were necessarily modified. In the current edition, computer-assisted language learning (CALL) becomes a central aspect of the training, since trainee teachers need to learn how to plan an online Italian language course, how to implement online methodologies and teaching techniques coherently with learners' needs, how to manage a live online classroom and how to assess language learners' knowledge and competence online.

Teacher learning in CALL is a very significant area within the field of teacher education in Italy due to the critical need for in-service and pre-service language teachers to become more technologically knowledgeable. In fact, the questionnaire administered at the beginning of the Practicum of the ongoing academic year (2019/2020) shows that almost 90% of the teachers have never taught through video conferencing systems and about 80% have never participated in courses/lessons taught in video conferencing; in addition several participants indicate explicitly that they expect to be trained to implement and manage an online language course, to use new instruments and resources, to apply teaching methods and techniques able to create a relaxed and co-constructive distance learning environment and to understand advantages and disadvantages that online learning offers to learners. In response to these needs, specific knowledge and skills are developed during the Practicum, under the tutors' supervision, including the usage of technologies offered by the synchronous learning management system (such as videoconferencing, text chat, file co-editing and desktop sharing), design of tasks appropriate to the online environment, design of activities "addressing social and affective factors such as community building in 'disembodied' computer-based environments" [6]. The development of CALL knowledge

and skills is realized at both technical and pedagogical levels [7], since trainee teachers directly apply their understandings and abilities in teaching practice. Fig. 3 shows an example of how trainee teachers manage an online classroom, controlling simultaneously the learner group on sub-video windows and teaching materials on Microsoft Word, sharing the computer screen.



*Fig. 3. Teaching practice on Microsoft Teams*

In the questionnaire some participants underline the importance of classroom interaction, complaining about the absence of physical interaction with students and describing possible difficulties in managing the affective component of interactions. From these considerations we can deduce that our trainee teachers consider interaction in face-to-face contexts as beneficial to L2 development, coherently with the theories of the interaction approach to second language acquisition [8]. Nevertheless, they have doubts about the relationship between interaction and learner outcomes within a computer-mediated environment. According to the interaction approach exposure to input, opportunities to produce output, feedback on learner's production through interaction and production of modified output are likely to lead to L2 development. Both text-based and voice-based synchronous computer-mediated communication might provide each of these components, allowing active learner participation, as well as great quality of language production and corrective feedback. A recent meta-analysis [9] demonstrates that there are no significant differences between synchronous computer-mediated communication and face-to-face contexts, suggesting that the mode of communication has no statistically significant impact on the positive developmental benefits associated with interaction. Based on these theoretical assumptions, the online language course taught by our trainee teachers is provided through the Microsoft Teams platform which allows for chat, video conferencing and audio calls (complete with document sharing and other useful features for teaching and learning), usable on computers as well as on mobile devices. The disadvantages related to Microsoft Teams, such as limitations of computer or mobile equipment or Internet connection, are minimal compared to the benefits, similarly to other voice-based synchronous resources, such as Zoom or Skype [10]. The same platform provides the conditions for a rich interaction between trainee teachers and their tutors, essential for collaborative work, in the above-mentioned social constructivist perspective. We leave it to future research to examine changes in preservice teachers' beliefs about classroom interaction in a computer-mediated environment and to document attitude, motivation and identity changes after their professional experience in CALL.

## 4. Some Proposals for Teacher Training Course Design

Summing up, the main issues that have been raised during planning, preparation and implementation of the online teacher training course are linked to questions regarding classroom interaction, collaborative work between trainee teachers and online teaching skills. As we have seen, in order to provide a teaching experience comparable to face-to-face classroom, the online course must allow for a rich teacher-student and student-student interaction. It is then necessary to instruct pre-service teachers how to plan and manage activities to involve participants in an ongoing dialogue, considering interaction as "the main ingredient in establishing and maintaining a vibrant online knowledge and learning community" [11].

Social interaction is fundamental not only in the classroom, but also between trainee teachers and their tutor. In our online teacher training course voice-based synchronous computer-mediated communication provides the conditions for co-construction of meaning in an environment where all participants mentor each other and have several occasions to collaborate, discuss and reflect about their own and the other's teaching practice. Using the term of Wang, Chen and Levy [12] a "cyber face-to-face" teacher training program is an environment that can reproduce these specific components of physical face-to-face communication.

Finally, language teachers need specific skills to teach online and these skills must be developed throughout the training. During the meetings with their tutors, trainee teachers receive both technical and pedagogical training in CALL, integrated with one another, and during the language classes they necessarily connect CALL education to authentic teaching settings. Distance training in this case is an example of situated learning where participants can try the tools they learn about [13]. However, in order to lower stress and anxiety, in future online editions it would be advisable to add an online platform training before the Practicum to introduce participants to the synchronous learning management system (Microsoft Teams).

"The growth of the Internet and proliferation of computers in school and home setting has led to a significant expansion of the use of technology in foreign and second language instruction. Increasingly, both language teachers in training and practicing teachers will find themselves at a disadvantage if they are not adequately proficient in computer-assisted language learning" [14]. The actual organization of the Practicum is filling this gap, helping future Italian language teachers learn to teach with technology, immediately applying academic knowledge about computer use to the contexts of professional activity and it can constitute an example of good practice for designing similar online training courses destined for foreign language teachers.

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# The Influence of Professional Burnout on Teachers' Professional Satisfaction: The Case of Lithuania

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## Abstract

*Teacher professional activity, its quality and work efficiency are conditioned by social changes and educational reforms. The major question guides this analysis – the focuses on the teachers' professional burning that affect the vocational satisfaction. Analysis of scientific literature was selected for the theoretical explanation of the research problem as well as a quantitative research method was selected for the empirical research. The indicators on the questionnaire scales provided an opportunity to determine the links between Lithuanian teachers' professional burnout and vocational satisfaction according to different structural stress dimensions. Statistical analyses were performed using IBM SPSS 23. Based on the results of theoretical and empirical research, the main factors influencing the interaction between occupational burnout and professional satisfaction were identified. The current survey has established the main factors affecting teachers' professional burnout, the main of which is significantly reduced ability to work, productivity, separation from work and profession, loss of control and self-control at work. Teachers increase professional satisfaction by Seeking personal fulfilment and self-realisation and wishing to contribute to social well-being.*

*Keywords: Teachers' Professional Burnout, Professional Satisfaction*

## Introduction

Teachers are facing new challenges that change the way they interact with the environment, change needs, and present long-term new changes. The article discusses the extent to which professional burnout is expressed in Lithuanian teachers' community as a whole, and its influence to teachers' professional satisfaction.

*The aim of the research* is to reveal the influence of teachers' professional burnout for professional satisfaction.

*The problem:* when researching the aspects of professional burnout and stress, it is seldom discussed: what is the strong/weak expression of burnout in the Lithuanian teacher community, what is its relationship with teachers' professional satisfaction.

*Methods:* To reveal the problem, an analysis of the scientific literature and a quantitative research strategy were chosen, for the implementation of which a written survey of general education school teachers was used according. The indicators on the questionnaire scales provided an opportunity to determine the impact of Lithuanian teachers' professional burnout on professional satisfaction depending on different factors of stress.

## Theoretical Framework

Teacher professional activity, its quality and work efficiency are determined by social changes and educational reforms. Teachers strive to adapt to unexpected challenges.

However, the changing distribution of teacher roles affect professional satisfaction and social well-being. This can be a cause of constant teachers' professional burnout.

More attention has been paid to research into teachers' professional burnout and stress in recent years (Denton, Chaplin & Wall, 2013; Hoglund, Klingle & Hosan, 2015).

The object of most research was the prevalence of teachers' professional burnout and stress (Maslach, 2003; Khan, Yusoff, 2014; Helms-Lorenz, Maulana, 2016; Fitchett, McCarthy *et al.*, 2018) and the possibilities of its overcoming and reduction measures in the institution (Pellerone, Rapisarda, Trischitta, Vitale & Ramaci, 2020). Lithuanian researchers examine the signs and causes of this phenomenon, distinguish risk and protective factors (Merkys, 2013; Stočkus, 2014; Kuniejūtė, 2016), as well as have been researching the peculiarities of professional burnout, have been searching connections with the teacher's age and gender (Merkys, Bubelienė, 2016, Navaitienė, Danilovienė, 2017). According to the World Health Organization (WHO), professional burnout is a syndrome resulting from chronic work-related stress, with symptoms characterized by "feelings of energy depletion or exhaustion; increased mental distance from one's job or feelings of negativism or cynicism related to one's job; and reduced professional efficacy" [8]. Summarizing the researchers' statements, teachers' professional burnout can be defined as: dissatisfaction with certain needs, in other words, increasing frustration with mental and physical symptoms that reduce self-esteem (Vollmer, 1998); long-term human response to constant emotional and interpersonal stress at work (Maslach, 2003); complete "drying out" of the personality (Smith *et al.*, 2001). Professional satisfaction is a pleasant and positive emotional state that is determined by the attitude towards the work done (Arnold, 2005); the totality of positive personal attitudes to work (Seta, 2000). Professional satisfaction contributes to teacher well-being because satisfied teachers are less sensitive to stress and burnout (Toropova, Myrberg & Johansson, 2020); are offering higher quality teaching and better learning support for pupils (Kunter *et al.*, 2013). Evans (1997) presented two main components of professional satisfaction: 1) job comfort – the extent to which a person is suitable for working conditions and circumstances; 2) performance of work – to the extent that it is satisfied with personal achievements with meaningful aspects of work [7].

Professional satisfaction surveys make it possible to determine teachers' motivational status and the factors that cause positive emotions at work.

## Methodology

An anonymous survey was conducted during the study. In the questionnaire, respondents assessed two variables – professional burnout (46 statements) and professional satisfaction (16 statements).

*Study participants and study sample.* The research set consisted of all 24,109 teachers working in Lithuania (2019-2020 ŠVIS data). 398 teachers participated in the survey (a representative sample of the survey – 381 respondents): 334 (84%) female and 64 (16%) male. This corresponds to the real relative distribution of men and women in the Lithuanian teacher community. The mean age of the study participants was 45.36 ± 13.14 years.

*Organization of the study.* The survey was conducted in 2019 in Lithuanian general education institutions. The teachers who participated in the survey had the opportunity to fill in the questionnaire online. The link of the survey together with a short description

of the study has been sent by e-mail to Lithuanian general education schools. Statistical data analysis was performed using the Social Science Statistics Package (SPSS 23) for Windows.

*Research ethics.* The survey ensured the anonymity of the study participants and their consent to participate in the study. The questionnaire was accompanied by an introductory letter indicating the subject of the study, the purpose and researchers contacts. The research was performed on the basis of an instrument developed by Bubelienė D. (2010). The author allowed the free use of two scales, which are designed to determine the impact of burnout of Lithuanian teachers on professional satisfaction.

**Research Findings**

The analysis of the data disclosed the influence of occupational burnout on the professional satisfaction of general education school teachers. Professional satisfaction is determined by internal (age, gender, level of education, length of service, career opportunities, recognition) and external (quality of management, salary, job content, co-workers, working conditions) factors. Professional burnout is a condition that is caused by an individual's work, and their relationship to their work may lead to this condition.

It has been hypothesized that male teachers and female teachers view professional burnout and professional satisfaction differently.

*Table 1. Distribution of professional burnout and teachers'*
*professional satisfaction by gender*

| Variables | Gender | N | Mean±SD | p-value |
|---|---|---|---|---|
| Professional satisfaction total | Male | 64 | 46.7±10.2 | 0.498 |
| | Female | 334 | 45.1±13.6 | |
| Professional burnout total | Male | 64 | 121.3±36.3 | 0.827 |
| | Female | 334 | 119.6±37.2 | |

In the study of female's and male's attitudes towards professional satisfaction, it was found (Table 1) that the difference was not statistically significant (p=0.498). In the study of female's and male's attitudes towards occupational burnout, it was found (Table 1) that the difference was not statistically significant (p=0.827) either. It can be assumed that female and male have similar attitudes to both occupational burnout and occupational satisfaction. The hypothesis: during the research, the opinions of teachers with different length of service differed in the assessment of teachers' professional burnout and professional satisfaction.

*Table 2. Distribution of teachers' professional satisfaction and professional burnout*
*according to the teacher's work experience*

| Teacher's work experience | | Professional satisfaction total | | | Professional burnout total | | |
|---|---|---|---|---|---|---|---|
| | N | Mean ± SD | p-value | | Mean ± SD | p-value | |
| 1-10 | 113 | 50.0±13.0 | | | 126.4±44.0 | | |
| 11-20 | 86 | 43.3±12.9 | | | 122.1±36.4 | 0.419 | |
| 21-25 | 77 | 46.5±9.9 | 0.018 | | 116.6±31.3 | | |
| 26-30 | 65 | 43.4±15.0 | | | 120.8±34.7 | | |
| 31-52 | 57 | 40.0±13.1 | | | 108.8±31.7 | | |
| Total | 398 | 45.4±13.1 | | | 119.9±37.0 | | |

During the survey of Lithuanian general education school teachers, it was clarified in which period of work at school professional satisfaction dominates among teachers and how professional burnout depends on the teacher's work experience. Both the joy of a teacher's job (mean=50) and the signs of burnout (mean=126) are most often experienced by teachers, who have been working at school for the first 10 years (Table 2). It is interesting to note that lower professional satisfaction (mean=40), but at the same time less stress, fewer signs of professional burnout (mean=108) are identified by teachers who have worked at the school for the longest time (more than 30 years).

The hypothesis: the assessment of teachers' professional satisfaction depends on gender.

*Table 3. Assessing the intensity of teachers' professional satisfaction by gender*

|  | Male, N (%) | Female, N (%) |  |
| --- | --- | --- | --- |
| Do not feel professional satisfaction | 27 (42.3) | 162 (48.6) | $\chi^2$=0,345; |
| Feels professional satisfaction | 37 (57.7) | 170 (51.4) | *df*=1; p=0,557 |

The Chi-square criterion revealed (Table 3) that when comparing the responses of male and female teachers about professional satisfaction, they did not differ statistically significantly because value p=x>0.05. The hypothesis that the assessment of teachers' professional satisfaction depends on gender has not been confirmed. Both male and female teacher professional satisfaction assessment did not differ ($\chi^2$=0.345, *df*=1, p=0.557). Although the difference is not statistically significant (Table 3), male teachers are slightly (58%) more satisfied with the teaching profession than female teachers (51%).

Using linear regression analysis, this study analysed how teachers' professional satisfaction is dependent on professional burnout. The value of the coefficient of determination $r^2$=0.411 showed that the linear regression model is appropriate [2]. The ANOVA p=0.000, so it can be stated that professional satisfaction depends on at least one of the regressors. The coefficients of the sample regression equation $b_0$=0.167 and $b_1$=0.655, β=0.641. In summary, applying linear regression analysis, it was found that teachers' professional satisfaction is dependent on teachers' professional burnout, because it satisfies the conditions of linear regression analysis, when p<0.001 of all variables.

According to the participants of the study, the most professional burnout is determined by three factors: significantly decreased working capacity, efficiency (mean rank = 2.24); separation from work and profession (mean rank = 2.23); feeling of loss of control and self-control at work (mean rank = 2.15). Using the Friedman criterion, it was found that the differences between the statements of the teachers who best meet the professional burnout are statistically significant ($\chi^2$=60,4, *df*=2, p=0,000).

**Conclusions**

- The study revealed that professional satisfaction in the work of a teacher depends on the length of service: teachers who work in the school for up to 10 years' experience the most joy in their work, and teachers who work in the school for the longest time experience the least joy. However, the study showed that the attitudes of male teachers and female teachers to the professional

satisfaction and burnout experienced are similar (the difference is not statistically significant).

- The results of the research confirmed that teachers' professional burnout is associated with significantly decreased working capacity, efficiency; separation from work and profession; feeling of loss of control and self-control at work (the difference between the statements most relevant to teachers' professional burnout was statistically significant).
- The results of the study confirmed that teachers' professional satisfaction is influenced by factors of professional burnout. Professional satisfaction is an integral part of a teacher's job in order to overcome obstacles and challenges in professional activities, resolve work conflicts, create conditions for effective collective learning and contribute to the efficiency of the educational process.

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# The Potential of *LMS-Course-Templates* to Foster Informed Acceptance of Digitization in Higher Education

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## Abstract

*Background: The Corona-Crisis enforced the implementation of digital teaching- and learning-formats (dTLF) in education. In order to support the academic staff effectively, a digital "Toolbox" [1] including step-by-step manuals was created. Functional a Moodle course [2], the "Toolbox" included an innovative element: the LMS-Course-Template. This template can be downloaded, modified and used as basis for a professional online teaching- and learning-course. In regard to the "Learning Design Research" it classifies as a "generic design" [3]. The reaction of the academic staff following the online publication of the "Toolbox" – including the LMS-Course-Template – was encouraging, as many colleagues had used templates in preparing presentations, but never in the context of a learning-management-system (LMS) like Moodle. Since then the improvement of the LMS-Course-Template became a main task.*
*Template-Elements: Today the template consists of the following main elements: (1) user friendly design, (2) pre-structured timeline, (3) recommendations for stand-alone-tools and tool-formations that are suitable for teaching and learning online and (4) several "frame elements". The latter are: a.) rules how to communicate correctly online, b.) suggestions how to increase learning motivation and c.) methods for improving self-organisation. In addition, different colours indicate the modification: Black is the default colour, supplement-explanations/step-by-step manuals are green, red serves as place holder of own course material and yellow mentions relevant scientific studies.*
*Conclusion: Drawing the analogy to the major use of templates in creating presentations, the LMS-Course-Template and its potential for fostering informed acceptance of digitization is underestimated. In the OER Movement [4] generic templates are almost irrelevant. The "sense of achievement", that the use of templates triggers, is likely to increase motivation and interest in dTLFs. The template fulfils its role as a "door opener" and increases the understanding of the functionality of the LMS, its tools and possibilities. The faculty has the possibility to achieve LMS-competence, curiosity in progress and informed acceptance of digitization.*

*Keywords: Template, Informed Acceptance, Digital Competence, Learning-Design-Research, Generic Design, Learning-Management-System*

## 1. Background

Rational and sustainable digitization is a main task for the future in all fields of life. In consequence our society, economy, production of goods, environment and education will change. New questions rise and sound answers have to be found. Several institutions act proactive and try to be part of the change instead of just being observers.

In regard to this development, the *Institute of Geography* at the *Ruhr-University Bochum* founded in the year 2019 a new team under the title: "Digitization in Education".

Each of the three team members is holding a degree in geography with different fields of specialization: from human and physical geography over didactics to geoinformation.

This was the starting point of speeding up the debate about digitization, gaining knowledge in the field and promoting certain well-chosen digital teaching- and learning-formats at the *Institute of Geography*. Implementation was accompanied by debates among colleagues and therefore the strategy was to implement flagship projects that will act as best-practice examples. This situation changed completely in March this year. The Corona-Crisis enforced the implementation of digital teaching- and learning-formats in education from one day to the other. As courses with physical presence were not allowed anymore, almost all analogue teaching was transformed to digital formats in less than three weeks. One of the main challenges was to enable the faculty to manage this transformation as smooth and professional as possible.

## 2. "Toolbox" and LMS-Course-Template

In order to support the faculty at the *Institute of Geography* effectively, a digital "Toolbox" [1] including step-by-step manuals was created by our team. Functional a Moodle course [2], the "Toolbox" includes the four main chapters "Structuring", "Powerpoint *et al.*," "One size fit all?" and "Online-Meeting-Rooms". In addition, there is a Forum for discussion and exchange of ideas, and the innovative element "Template".

The latter is titled in the "Toolbox" as "Template: Kurs und Inhalte". Graphic 1 gives an overview of the digital "Toolbox" and its content.
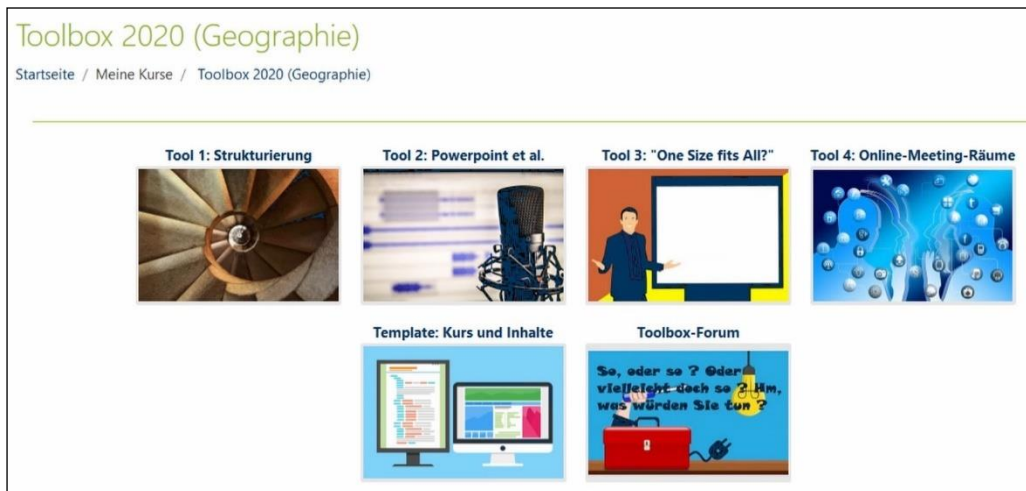


*Graphic 1. Overview of the digital "Toolbox" created in order to support the faculty in the transformation of analogue teaching content to digital teaching formats. The LMS-Course-Template is part of the "Toolbox" (title: "Template: Kurs und Inhalte")*

The LMS-Course-Template can be downloaded as a .mbz file, modified and used as basis for a professional online teaching- and learning-course. The .mbz file is a backup file created in Moodle, which can be used by course-creators to restore an existing course or – in our case – to duplicate a created course structure (including frame elements), as a so-called template. For this procedure it is not necessary to have administrator-rights, the assigned role as course-creator or teacher is sufficient.

In regard to the "Learning Design Research" this kind of template classifies as a "generic design", that means, the structure (including frame elements) is provided in form

of a template, not the learning content itself. The learning content will be placed into the template by the correspondent lecturer. Therefore, a "template could be used for multiple topics within a single discipline, or ideally across multiple disciplines" [3].

The reaction of the academic staff following the online publication of the "Toolbox" – including the LMS-Course-Template – was encouraging, as many colleagues had used templates in preparing presentations, but never in the context of a learning-management-system (LMS) like Moodle.

Since then the improvement of the LMS-Course-Template became a main task.

Considering the experience and research results of *DALZIEL & DALZIEL* (2012), we tried to reduce the risk of "information overload" and to fulfil the "preference for brief advice followed by a rapid move to "hands-on" exploration of the templates, rather than detailed "up-front" pedagogical advice." [3]

## 3. Template Elements

Today the template consists of the following main elements: (1) user friendly design, (2) pre-structured timeline, (3) recommendations for stand-alone-tools and tool-formations that are suitable for teaching and learning online and (4) several "frame elements".

The frame elements are: a.) rules how to communicate correctly online (so-called Netiquette), b.) suggestions how to increase learning motivation and c.) methods for improving self-organisation. Graphic 2 shows all elements of the LMS-Course-Template.
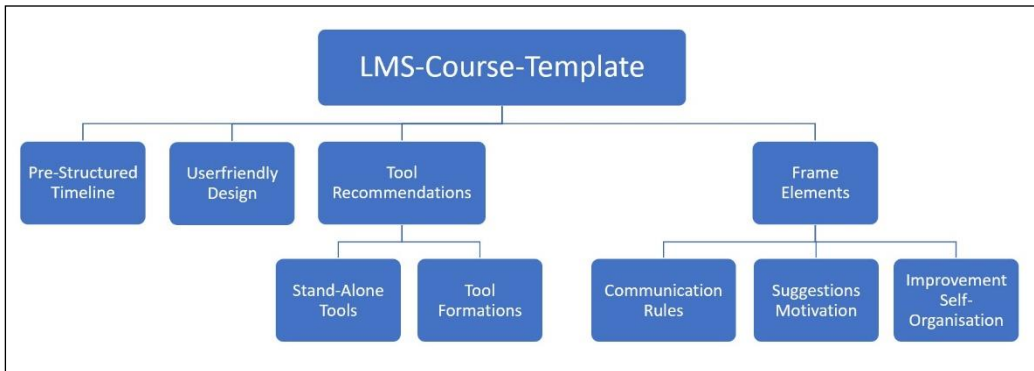


*Graphic 2. Elements of the LMS-Course-Template*

In addition, different colours indicate the possibilities of modification: *Black* is the default colour in Moodle. Text that should remain and not be changed is written in *black*.

Supplement-explanations and step-by-step manuals are *green*, *red* serves as place holder for the upload of own course material and *yellow* mentions relevant scientific studies related to the topic of didactics in higher education. Graphic 3 gives an example of the use of different colours in the template with the aim to facilitate orientation in and usage of the template.
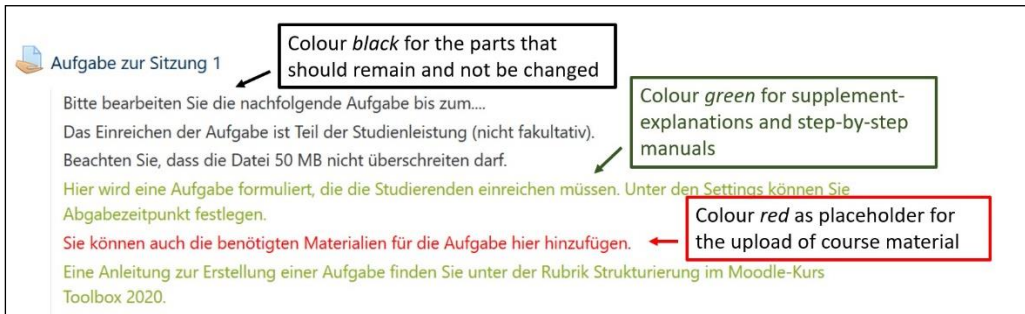
*Graphic 3. Usage of Colours in the template with the aim to facilitate orientation*

The template is still in progress and it is our plan for the future to implement more helpful ideas and structures.

## 4. Positive Side-Effects and Challenges using LMS-Course-Templates

The main reasons for using a template are in general saving time and being guided through a digital creation process without having a deep understanding of the basic application or program. But there are some "side-effects" that attracted our attention. As this paper is experience-based the following observations are a starting point of an inductive approach, which might be followed in future by deductive research. At this moment we point out that the usage of a template that has a high usability and a similarity to already well-known templates in the field of creating presentations, can trigger a "sense of achievement" during the creation process. This is likely to increase motivation and interest in digital teaching- and learning-formats. Also, DALZIEL & DALZIEL (2012) are pointing out the effect of inspiration that the ideas shown in a template can have on the course-creators [3]. Therefore our hypothesis is: templates – offered during the creation process of a digital learning- and teaching-course – are (1) increasing the understanding of the functionality of the learning-management-system, (2) mitigating negative preconceptions about digital education and (3) enabling an informed acceptance of digitization in higher education.

The term "informed acceptance" is used in analogy to the term "informed consent" in the health and medical sector. Informed acceptance indicates the shift from personal preconceptions and resistance to change to a well-informed, outcome-oriented and solution seeking perspective. It has to be discussed if the terms "informed tolerance" or "informed progress" might be more appropriate than "informed acceptance". At this stage of reflection, we decided to use the term "informed acceptance".

Another challenge will be the way, how a template is introduced to the faculty.

Research showed that "the way ... templates were presented had a significant impact on the willingness of educators to explore them further". Often, templates were only used for collecting ideas to enrich their own teaching, but the real purpose and potential of a template was left behind [3]. We are looking forward to the semester evaluation that will take place in July 2020 to gain more insights of the potential of the LMS-Course-Templates developed at the *Institute of Geography*.

Our goal is not the complete digitization of education in the sense of "what is technically feasible". Foremost the digital transformation in education is in our opinion a process, driven by scientific knowledge, professional experience and rational arguments.

The use of templates can help to build a bridge especially to the fraction of faculty that are general opponents to digitization in higher education. And it can support

lecturers and teachers that are interested in the use of digital teaching- and learning-formats, but lack of knowledge and support stops them from implementation.

## 5. Conclusion

Drawing the analogy to the major use of templates in creating presentations, the LMS-Course-Template and its potential for fostering informed acceptance of digitization is underestimated. In the OER Movement [4] generic templates are almost irrelevant. From our experiences we draw the conclusion that the "sense of achievement", that the use of templates triggers, is likely to increase motivation and interest in dTLFs. The template fulfils its role as a "door opener" and increases the understanding of the functionality of the LMS, its tools and possibilities. The faculty has the possibility to achieve LMS-competence, curiosity in progress and informed acceptance of digitization.

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# The Third Millennium Teachers Train on their Really Needs: The Albania Case

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## Abstract

*The aim of this article is to provide an overview on the training of Albanian teachers thus far and the implications for future teacher training policy in Albania. Recently, in pre-university education a new curriculum was introduced to replace the old one. This initiative had to be based on specific research to reveal the problems of the old curriculum. In addition, the current state of human and infrastructure resources was ignored in making this decision. This move has caused a fair amount of chaos regarding the training of teachers in order for them to respond to the requirements of the new curriculum and pupil achievement. In this respect, this paper provides important insight regarding: a) What are the teachers perceptions of trainings provided by public and private organizations and the universities? b) According to the legal framework it is obligatory for each individual teacher to obtain one credit in teacher training. The issue is: Is this enough or is it necessary to provide teachers with complementary training modules. c) What are the criteria which determine the training modules in which teachers are to participate? d) Have the previous training seminars changed the quality of teaching and learning? e) Are Albanian teachers trained to teach in ways that will provide pupils with the necessary knowledge and skills that citizens of today`s society need. It is hoped that the findings of this paper will help policy makers to make informed choices and establish a well thought out strategy.*

*Keywords: training, new curriculum, teaching, learning, educative policy*

## 1. Introduction

The curriculum framework is one of the most important aspects of pre-university education reform. The purpose of this article is to know if reforms are being implemented to accomplish their objectives. In this regard, the quality of teachers pre-service and in service, takes a special importance. In Albania there are problems with the quality of teachers and they have difficulty in the implementation of the curriculum for the fact that they lack knowledge of ICT and the adeguate infrastructure to support the teaching and learning process. Given the problems raised, teacher training plays an important role.

We will therefore see the impact of these training courses on the teaching and learning process and whether the legal basis for compulsory credits is sufficient for teachers. Finally, we suggest that educational policies should pay more attention to finding the most appropriate ways of implementing curricular reforms, also looking at the social and economic level of the country.

## 2. Literature Review

### 2.1 Changes in the Pre-university Curriculum and their Connection with the Universities

In the period before the 1990s, in-service teacher's qualification was carried out without interruption in an organized manner by the Ministry of Education, periodically every five years, ideo-pedagogically and scientifically [6]. Curricula in Albania have been constantly changing, especially after the 1990s. Institutions responsible for their improvements and monitoring also undergo changes. In year 2003 the Institute of Curriculum and Standards and the Training and Qualification Center for Education were established. Then in year 2007 the Institute for Curriculum and Training was established and finally in year 2010 the Institute for Education Development was established [1, 2, 3]. Until 2009 we have the "Subject-Based Curriculum" model then shift to the "Learning-Based Curriculum" model and in 2014 the "Competency-Based Curriculum" enters into force where it still applies today [2, 3, 4]. These constant changes and improvements have not always been very well organized and well thought out. In all pre-university education strategies, it is read that there is still much work to be done and often agrees with the main trends of education development in Europe but it is not said that these trends will suit Albania at social and economic levels.

The implementation of today's curriculum remains a serious problem due to the lack of supportive infrastructure in schools. Putting this curriculum into practice remains a challenge for many teachers. The methods that work best in the classroom, in terms of enhancing teaching and learning, suggests that teacher-led behaviourist style is more effective than constructivist-style education [5]. Pre-service teachers' preparation has not been at the right rhythm, the challenges of improving new programs are high and the need for well-trained staff is unquestionable. It is also found that university curricula are often overloaded and no attention is paid to what study programs are needed for successful teachers [2, 3, 4].

Thus, there is a need for connection between school and university in unifying and adapting programs [3, 4], as there is little or no similarity between programs offered by universities nationwide. In this regard, the relevant entities have set up working groups and completed the first drafts of this adaptation but still at university the course development is still characterized by behaviourist pedagogy rather than pupil-centered techniques [5]. So pre-service teachers have deficiencies in the application of today's curriculum.

### 2.2 Trainings and Infrastructure

The period 1990-2002 was characterized by a lack of rigorous teachers' training.

Universities were responsible for providing initial teachers training, but their on-the-job training was not coordinated. The lack of a coherent approach has led to a decrease in the quality of teachers and an increase in the number of unqualified teachers in schools [2]. In the years to come, there has been some change with the introduction of alternative models for providing teachers' training. However, shortcomings are noted and substantial and comprehensive interventions are required. Trainings were not always planned from the teacher's professional standards and their content was not designed based on clear competency objectives, so spontaneous tendencies were introduced [2, 3]. The 2009-2013 training service was unaccredited through quality assurance standards, deficient in the diversity of training agencies, imbalanced between courses and a very low adaptability to the needs of individual and group of teachers in general and towards new teachers in particular [3].

Today, IED (Institute of Educational Development) is the leading provider of training,

but there are also private agencies, non-profit organizations and universities, which are subject to accreditation by a special commission. The database of training programs lists 52 accredited training providers and 418 accredited training programs. However, little is known about the quality and impact of training programs, an area which, in the near future, IDE plans to examine more closely [5].

Currently, teachers have the obligation to attend three days of training (18 hours) in one academic year. They can select from a training catalogue the topics they want.

Current three-day training is not enough to reduce the gap that exists in curriculum implementation, so additional training lasting more than 18 hours should be provided [5].

One of the main problems with curriculum implementation is the lack of adequate ICT infrastructure. Many schools lack internet access in classrooms and even libraries. There are not enough computers, so it is clear that pupils have more access to information technology at home than at school.

Even staff also has limited knowledge of available technologies. There are teachers who use traditional teaching when they are increasingly faced with a lack of resources in the classroom (especially the need for ICTs, smart boards, etc.) [5]. ICT is recognized as a priority in the advancement of education in Albania; the challenge lies in integrating and using it within the current curriculum model.

## 3. Methodology

The methodology of the study is designed to draw conclusions and compare the opinions of all pre-university teachers involved. The methodology is of a descriptive type.

The study is conducted in two stages:
- Survey of teachers through a questionnaire,
- Interviews of teachers surveyed on deepening responses.

The instrument for collecting data was a questionnaire and consisted of 35 assertions, 25 of which were closed-ended responses and 10 were open-ended responses. The study was conducted nationally and the sample of this study consists of about 200 teachers, a number of whom also obtain qualitative analysis of open-ended responses. The teachers were informed in advance about the purpose of this study so the data obtained are valuable. During the application of the questionnaires ethical issues were taken into account while ensuring the anonymity of the individuals. Data processing was done with SPSS and Excel software.

## 4. The Albanian Context – Data

From the analysis performed using Chronbach's alpha coefficient to measure the reliability of the instrument used, we conclude that the instrument has a very good reliability: 35 assertions, α=.831.

There are many training providers in Albania, the teachers' perceptions of the training provided are given in the table below:

| Agencies | Evaluation in % | | | Weighted average 1-3 Points |
|---|---|---|---|---|
| | Not good | Good | Very good | |
| IED | 6.9 | 50.7 | 42.5 | 2.35 |
| Universities | 3.6 | 53.6 | 42.7 | 2.39 |
| Non-profit organization | 8.3 | 52.1 | 39.6 | 2.31 |
| Private | 12.6 | 58.3 | 29.1 | 2.15 |

*Table 1. Evaluations of trainings*

In table 1 we find that teachers feel better at universities, then at IED, the lower ratings are received by private agencies.

Let 'see participation and what teachers think of the legal framework for compulsory training. Attendance at one-year training is given in the table below.

| Trainings at one year | % |
|---|---|
| One time | 19 |
| Two times | 23.6 |
| Three times | 22.4 |
| More than three times | 27.6 |
| Sometimes yes sometimes no | 7.5 |

*Table 2. Number of trainings*

In Table 2 we can see that 19% of the teachers strictly apply the law, 7.5% of them sometimes yes sometimes no. 73.5% has more participation than required by law. The questionnaire also shows that 70% of teachers disagree with the legal basis, so teachers require more frequent training.

The criteria that teachers choose for trainings are:
- the need for the school-teacher-pupil trinomen,
- the place where they are developed,
- it is enough to be certified with a course of any kind.

Looking at the criteria we have three types of teachers, those who choose the right criteria for training, those who want to choose the right criteria but fail economically, those who do not see the topic of training at all. The third category is in a not small percentage. The annual training curriculum exists but is not carried out.

A delicate problem is the impact of training on the teaching and learning process. In most cases the training provided does not affect this process because:
- the Albanian school does not have the right infrastructure, the training provided is for conditions not like ours,
- a large number of pupils per class,
- short class time and many intense schedules.

The survey shows that for 30% of teachers the training provided does not help the implementation of today's curriculum. Next, 45.1% of teachers are still in favour of the old curriculum, 40.1% in favour of the new curriculum, 14.8% speak of a combination of both. The trainings provided are of general category where 21% of teachers say they do not receive training for their subject and 38.3% say sometimes yes and sometimes no.

## 5. Conclusions and Recommendations

In the current state of pre-university education in Albania, teacher trainings play an important role. Educational institutions need to be more careful in monitoring and continuously updating training. The following conclusions and recommendations emerge from the study:
- Of the training agencies, universities have the best perception of teachers but for many teachers their distance limits participation. As a solution, we think that universities and other agencies offer online training. This format solves problems of place, time and costs.
- Teachers require additional, free and frequent training. The legal framework needs to be reviewed; we suggest mandatory training courses of over 30 hours.

- There are many teachers who choose any kind of accredited module without even looking at the needs of the school-teacher-pupil trinomen. The annual training syllabus must be strictly carried out and as training monitoring does not work well, a form must be found to ask teachers what they have been trained for.
- In most cases, the training provided does not affect the teaching and learning process due to the lack of school infrastructure, the large number of pupils in the classrooms. For many reasons, the Albanian government should significantly increase the budget for investment in education.
- The trainings are of general categories, with more theoretical than practical approaches, teachers do not find specific trainings for their subject. Training is needed to be close to the Albanian reality and the voice of the teacher to be felt in their updating.
- At the foreign language competence should be given greater prominence, with non-on-the-service teachers leaving university with this deficiency.

Finally, there is still a lot of work to be done to make trainings more effective for teachers and to provide pupils with what they need as citizens.

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# Examining Twitch as a Multimodal Learning Platform

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## Abstract

*As live-streaming sites have proliferated, they have garnered the attention of researchers interested in the learning affordances of multimodal live-streaming. Technology has transformed literacy practices which in turn has reconceptualized the ways in which learners engage in virtual learning spaces [1]. At the time of this paper, Twitch.tv (hereby referred to as Twitch) is the largest live-streaming site with nearly 15 million daily active users and over 3 million monthly creators [2]. Although Twitch originally was a site for E-sports, a growing number of streamers have discovered that Twitch's digital affordances allow them to create channels to stream their learning in order to crowdsource knowledge from fellow learners and experts [3]. This 'crowdsource model' of learning thrives in Twitch's digital ecology [4]. The learning affordances of Twitch are evaluated in this paper in two ways. First, we use multimodality as a theoretical framework to analyse the learning affordances of Twitch in the ever-expanding digital resources in virtual spaces. Next, we describe how live-streaming is leveraged by learners to attract participants who support their learning. We conclude with recommendations for future research that explore how learner-facilitated crowdsourced live-streaming can benefit live-long learners to improve learner outcomes.*

*Keywords: multimodal learning, crowdsource learning, collaborative learning, Twitch*

## 1. Introduction

Social media is a classification of popular technologies that facilitate interactive connectivity where "everybody and anybody can share anything anywhere anytime" [5]. Live-streaming has only recently begun to flourish under new technology capabilities. This virtual 'Third Place' [6] attracts millions of streamers who broadcast activities while interacting with live audiences. The largest live-streaming platform, Twitch, reported approximately 15 million daily active users and over 3 million monthly creators [2]. Twitch's platform provides a rich virtual environment that fosters collaboration through live-streaming [7, 8]. From its inception, Twitch has primarily been used for gamers to stream their live gameplay as an emerging form of *Edutainment* [9]. Twitch's model mirrors the 'expert model' in which those with greater expertise broadcast from their channel for others to join, watch, learn, and interact [10]. However, an increasing number of Twitch users draw upon Twitch's digital affordances to stream their learning and crowdsource knowledge, which makes the technology itself an important part of learning. Users have access to channels featuring streamers learning to code, writing a novel, or making digital art. The opportunity to self-direct one's own learning in an open forum allows for autonomy and acquisition of knowledge and skills. The culture of Twitch fosters community building and collaborative learning by nurturing models of mentorship and apprenticeship, common in gaming affinity spaces [11].

## 2. Theoretical perspective

Multimodal learning via live-streaming in open access platforms is informed by constructivist and socio-technical theories. These theories help to contextualize and explain how learners are motivated to construct new knowledge collaboratively within virtual spaces.

### 2.1 Constructivist and socio-technical theories
Education theorists, influenced by constructivism and post-structuralist theories of socially constructed knowledge, [12, 13], highlight the fact that technology transforms literacy practices, which in turn reconceptualizes the ways learners engage in virtual spaces [1]. A social constructivist view describes learning as socially mediated, the social and individual co-constructing knowledge interdependently [14]. Socio-technical theory extends social learning to the interaction between people and technology, especially with the advent of digital platforms that have a transformational impact on social behavior.

Knowledge and skill building takes place within virtual ecologies in a way that would not be possible without the specific technology [15].

### 2.2 Multimodal learning
Multimodal theory offers a reconceptualization of learning in the digital age where communication is achieved through diverse modes and technologies. Multimodality provides a framework for the study of learning affordances and social interaction within complex virtual environments, since meanings are constructed through "linguistic codes such as visual, written and spoken, sound, gesture, and spatial concepts" [16]. Kress and Selander characterized multimodality as an interactive and transformational way to understand learning in virtual environments [17]. Twitch's multimodal platform fosters socially constructed knowledge by integrating real-time broadcasting and voice and chat.

### 2.3 Digital affordances
Defined as aspects of an environment that provide resources that can be utilized by a user [18], affordances are contextual and related to one's ability to utilize them. Users must recognize the affordance and understand how it can be used to benefit from it [19].

Finally, affordance theory ensures focus on the environmental opportunities available (or not available) while considering whether users have the skills and resources to access them. In formal spaces, educators often walk learners through digital affordances of technologies. In informal learning, digital affordances are often discovered, and even manipulated, by users. Furthermore, in informal settings, users often create new affordances that expand the original intentions of the platform [20].

## 3. Collaborative online learning

A number of practices and technologies facilitate collaborative learning online [21].

Institutional technologies, such as discussion forums in learning management systems, afford opportunities for users to collaborate asynchronously, while live video streaming platforms such as Zoom offer opportunities for synchronous collaboration [22].

Increasingly, commercial technologies designed to improve collaboration are either licensed by universities for formal faculty use or are adopted informally [23]. Digital affordances of specific technologies and platforms contribute to student learning and that social learning improves both student satisfaction and outcomes [24].

### *3.1 Synchronous live-stream learning*

Synchronous live-streaming software, such as Zoom, allows educators to connect with students through video, voice and chat in order to increase social presence and interaction [25]. Especially during covid-19, when most class interaction is online, platforms like Zoom have been harnessed for online instruction [26]. However, live-stream sites such as these are on a closed platform (e.g., the host must invite the participants) which limits the audience, and typically mirror traditional classroom hierarchies in which the instructor directs the learning. Twitch's platform differs in that it consists of open-access channels that are searchable by categories, labels and tags.

### *3.2 Crowdsourced learning*

Though the primary Twitch content is video gaming, users have repurposed the network to create education and learning channels. In these channels, streamers harness Twitch to broadcast their own learning and invite fellow learners and experts to participate, fostering socially constructed knowledge. Learning channels include streamers who share their efforts to learn to code, create art, or write while soliciting feedback from participants. Streamers who broadcast their metacognition, which is facilitated by four digital modes of technology (computer desktop, webcam, chat and audio), while socializing and working collaboratively with participants (Bingham, 2017; Jewitt, 2013). In this way Twitch's technological affordances support a 'crowdsourced model' of learning that allows students to self-direct their development of skills and knowledge (Zhang & Liu, 2015). Rather than the typical model of the expert streaming (e.g. teaching) and the novices joining as participants (see figure 1), a crowdsourced model of learning puts the learner at the center of their own learning experience (see figure 2.).



Figure 1. Expert Model. Top down learning from expert to novices.

Figure 2. Crowdsource Learning Model. Here the learner streams; inviting others to join, support, and help advance their learning.
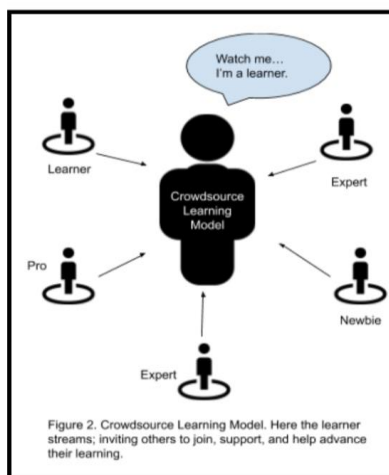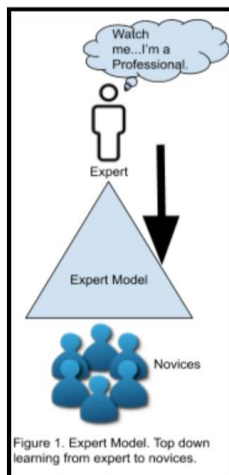
## 4. Conclusion

Twitch offers a dynamic multimodal digital platform that allows for collaborative online learning, and is interesting to educational researchers as a multimodal platform that allows experts and novices to mentor, model, and participate in a learner-directed social learning. Twitch's crowdsourced live streaming platform allows general users to broadcast their content with a very little learning curve. One is easily able to enter Twitch,

browse, watch live streams, and interact as well as become a broadcaster. Twitch's ecology represents a unique learning platform in that it has a low threshold for novice users to join real-time collaboration with participants across the experience spectrum [27]. Twitch brings together theoretical, practical, and technological concepts to deliver a multimodal learning experience. In an era of need for user-centered informal learning spaces, live-streaming harnesses the power of user preferences for empowered self-directed learning. Despite the innovation of this learning model, it has not made a significant appearance in formal learning literature. Given research that suggests that digital technologies are reshaping the ways that young people learn, from brain development to reading and information processing, researchers should explore new ways of thinking about live-streaming regarding best practices, and lessons gleaned from self-directed learning that has the power to transform formal education environments.

### 4.1 Future research

Further research is needed to understand how the cultural aspects of live-streaming services such as Twitch foster learner agency and collaborative learning [27], as well as the goals and motivations of live-streamers and participants, and how these motivations might inform formal learning. Further research holds potential for insight about the ever-expanding digital resources of multimodal virtual spaces that have potential to inform formal learning and improve learner outcomes.

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