



Digital Challenges in Education Crisis – Case Study of ESTGL

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Abstract

The continual advances in technology are changing the way students learn, connect and interact every day.

The coronavirus pandemic (COVID-19) has paralyzed life around the world, reporting restrictive measures (that include avoidance of social interactions and the prohibition of circulation between national and international territories) that were considered non-essential activities like factories, services and including all the education institutions.

It predicted that in coming years approximately 75 per cent of all new jobs will require qualifications and skills in the areas of science, technology, engineering and mathematics (STEM)

STEM is an approach to learning and development that integrates the areas of science, technology, engineering and mathematics. Skills developed by students through STEM provide them with the foundation to succeed at school and beyond.

This research project focuses on anticipated needs for skilled workers and strategies, including the scaling up of investments in Information and communication technologies (ICT) education and training, more efficient management, concerned the wellbeing of students and teachers.

During the state of emergency, teleworking is mandatory as the work function and classes are compatible with e-learning and homework. This research project focuses on anticipated needs for skilled workers and strategies, including expanding investments in Information and communication technologies (ICT) education and training and more efficient management of student and teacher well-being.

The study carried out in a higher education institution located in the northern region of Portugal, with approximately 700 students from all over the country and islands.

The methodology used was documentary, through indicators of student satisfaction and success, result of the reports of engineer courses during 2019-2020.

Keywords: ICTs, STEM, higher education, pandemic crisis, teachers, students

1. Introduction

The coronavirus pandemic (COVID-19) has paralyzed life around the world, with several countries reporting school closures. The urgent imperative to 'move online', caused by the recent Covid-19 pandemic (World Health Organization, n.d.) [1], has added to the stresses and workloads experienced by university faculty and staff who were already struggling to balance teaching, research and service obligations, not to mention the work-life balance (Houston, Meyer and Paewai 2006 [2]; Houlden and Veletsianos 2020) [3]).

In the EU 150, million people have little or no digital skills. With 20% of the recovery and resilience fund for # digital transition, what measures to combat digital inequalities? On the other hand, for qualifying workers who are lefted behind?

Pandemic effects can generate demotivation and dissatisfaction, or even discomfort, since it is an activity and structure built based on relationships, in largely face-to-face relationships, which make the pedagogical act a moment of interaction and sharing.

We are still not sure whether such a loss will translate into a reduction in human capital availability, with negative effects on productivity growth, innovation and employment, including lower future earnings for groups of students directly affected by the block.

Digital Technology looks closely at one significant facet of our rapidly evolving digital lives: how technology is radically changing our lives as teachers and students.



Strategies in the era of Digital Disruption will provide you and your team with the tools, concepts and perspectives necessary to respond correctly to the digital transformation, and to turn its threats into opportunities with which to improve your performance and that of your organization.

Many institutions have opted to cancel all face-to-face classes, including labs and other learning experiences, and have mandated that faculty move their courses online to help prevent the spread of the virus that causes COVID-19.

During the state of emergency, teleworking is mandatory as the work function and classes are compatible with e learning and homework. This research project focuses on anticipated needs for skilled workers and strategies, including expanding investments in Information and communication technologies (ICT) education and training and more efficient management of student and teacher well-being.

Guy Ryder Director-General of the International Labor Organization (ILO (2020)) says the key role that male and female teachers played in responding to and recovering from the pandemic recognized their role “to ensure that an entire generation of students can reach their potential and the importance of education to stimulate economic growth”.

It is necessary to draw attention to the importance of looking at the work of teachers, in this pandemic, as an important work. For this professional group and for the great responsibility that governments and social partners have towards these professionals with regard to the protection of their health, safety and well-being, the security of their employment and the commitment to improvement.

Tara Beteille (2020) [4] in an interview said that “teachers must be equipped to assess students when they return to school so that they can identify what essential content and skills have been lost and need to be rebuilt - as well as detect warning signs of abandonment” .

Hélène Landemore (2020) [5] said that “One of the most far-reaching transformations in our era is the wave of digital technologies rolling over—and upending—nearly every aspect of life. Work and leisure, family and friendship, community and citizenship have all been modified by now-ubiquitous digital tools and platforms.”

Santos (2020, p. 13) [6], draws attention to the new idea of normality. In fact, the reality we live in is an exceptionality of exception, and reflecting on this time of abnormality is extremely complex, because “The problem is that the chaotic and elusive practice of days is beyond theorization and demands to be understood in sub-theorizing mode”.

Lucy Bernholz(2020) [7] said “We must consider whether and how our networks of digital communications accommodate and protect individual rights to expression and association in ways that also protect privacy and resist corporate or state surveillance.”

Solve in relation to both the current moment and in the near future, the feeling that one is at risk, can only through effective physical isolation and the absence of contact with eventual carriers of the virus, which generates a enormous sense of distrust and uncertainty.

As we can see in the Technical report by the Joint Research Centre (JRC), the European Commission’s science and knowledge service (2020, p.4)[8], “a few selected EU countries consistently indicate that, on average, students will suffer a learning loss”. From their analysis, we can report three important reasons to this problematic matter. “First, there is evidence showing that quarantined students tend to spend less time in learning compared to when schools are open. Second, many students confined at home due to COVID-19 may feel stressed and anxious, and this may negatively affect their ability to concentrate on schoolwork. Third, physical school closure and the lack of in-person contact may make students less externally motivated to engage in learning activities” (JRC, 2020, p.4).

These new frameworks reflect the realities of modern strategy, introducing concepts that were unknown a decade ago, and then challenging executives to use them on case studies that will have relevance to their own circumstances.

We can conclude that in all the high education tasks, strong school leadership will be key. Countries will need to devote the necessary financing to achieve these goals — and they will need to bridge digital gaps — if they want a generation of flourishing young people.

Instructional design (ID) and learning design (LD) can be characterized as ‘a process, or series of suggested steps, that teachers can use to plan, implement, and evaluate their instruction’ (Carr-Chellman 2016: xiv)[9].

To promote transnational cooperation and share good practice in the field of innovation for science education.

It is predict that in coming years approximately 75 per cent of all new jobs would require qualifications and skills in the areas of science, technology, engineering and mathematics.



2. STEM a New Away of Education

The global economy is changing. Current jobs are disappearing due to automation and new jobs are emerging every day because of technological advances. What is STEM education? It's widely accepted that the acronym STEM stands for "science, technology, engineering and mathematics. Through STEM, students develop key skills including problem solving, creativity, critical analysis, teamwork, independent thinking, initiative, communication, digital literacy. According to the National Science Teachers Association (NSTA), "A common definition of STEM education [...] is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy."

STEM is an approach to learning and development that integrates the areas of science, technology, engineering and mathematics. As the current emergency remote teaching (Hodges et al. 2020)[10] situation invoked by the Covid-19 crisis is also new to the students, teachers must take into account the time and effort they need to regulate themselves in order to adapt to the new learning situation.

There are two ways to improve some solutions:

- a) one way of doing so, is to make self-regulation a part of the assessment, for example, through self-reflections or portfolios;
- b) another way is to propose self-paced, asynchronous activities (always within a pre-defined timeline) as part of the students' learning process and indicate clear ways of assessing students' participation.

3. Case Study – ESTGL/PV

The method used for this exploratory study was an report analysis, based in administrative documents that were validated. The study carried out in a higher education institution located in the northern region of Portugal, with approximately 700 students from all over the country and islands. It's a faculty that has an important course that can interact with the others – Engineer and Telecommunications. The methodology used was documentary, through indicators of student satisfaction and success, result of the final pedagogical reports of both courses. Comparisons made with the homologous situation for the year 2019/2020. The present article focuses on the pedagogical preparedness of university students and teachers with no or little experience in online teaching. There is no doubt that STEM empowers individuals with the skills to succeed and adapt to this changing world. The continual advances in technology are changing the way students learn, connect and interact every day. Skills developed by students through STEM provide them with the foundation to succeed at school and beyond. How those it happened in ESTGL? Is important to analyze how students develop key skills including: problem solving, creativity, critical analysis, teamwork, independent thinking, initiative, communication and digital literacy. From a sample of 55 students in Engineer and Telecommunication Course, in the academic year 2019-2020, made an assessment submission 79,2%. In Unit Credits (Ucs) average attendance (%): 66.6. Success with enrolled students 73.4 and failure in relation to subscribers 26.6. Access specifics: Mathematics or Physics and Chemistry and Mathematics.

The forced digitalization of teaching and learning during the Covid-19 pandemic is clearly one of those emerging topics (Jandrić and MacLaren, 2020) [11]

Fig.1. Legend – STEAM in ESTGL (Scientific areas)

| Scientific Areas that can be worked on digital - TIC (%) | All of them have already been done in the academic year 2019-20 and 2020-21 with the availability of content in Moodle as well as teaching via platforms Colibri or Teams (due to covid19) |
|--|--|
| Math | 16,7 |
| Physics | 9,4 |
| Computing | 20,0 |
| Electronics | 22,8 |
| Telecommunications | 23,3 |
| Languages | 1,1 |
| Economic and Business Sciences | 2,2 |
| Project | 4,4 |
| Total: | 100,0 |



4. Conclusions

The Educational Institutions of high education announced changes in the organizational structures. The post-COVID-19 phase will offer many opportunities to “Build Back Better” that is strengthen quality and equity in school systems. Countries will need to devote the necessary financing to achieve these goals — and they will need to bridge digital gaps — if they want a generation of flourishing young people.

We can conclude that in all the high education tasks, strong school leadership will be key. Countries will need to devote the necessary financing to achieve these goals — and they will need to bridge digital gaps — if they want a generation of flourishing young people.

As the International labor organization director said, there is no doubt that our new report on homeworker’s calls for better protections for the hundreds of millions of people working from home globally.

Pandemic effects can generate demotivation and dissatisfaction, or even discomfort, since it is an activity and structure built based on relationships, in largely face-to-face relationships, which make the pedagogical act a moment of interaction and sharing.

Collier (2020)[11], said in her article Higher Education After Surveillance “is *aiming to analyze current surveillance practices in the higher education sector (including broader educational technology, policy and other spaces) and trying to understand what post-surveillance futures might be desirable and how to work toward these*”.

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6. References

- [1] World Health Organization (n.d.). Coronavirus disease (COVID-19) pandemic. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>. Accessed 12 february 2021.
- [2] D., Meyer, L. H., & Paewai, S. (2006). Academic staff workloads and job satisfaction: expectations and values in academe. *Journal of Higher Education Policy and Management*, 28(1), 17–30. <https://doi.org/10.1080/13600800500283734>
- [3] Houlden, S., & Veletsianos, G. (2020). Coronavirus pushes universities to switch to online classes – but are they ready?. *The Conversation*, 12 March. <https://theconversation.com/coronavirus-pushes-universities-to-switch-to-online-classes-but-arethey-ready-132728>. Accessed 22 February 2020.
- [4] Beteille, T. (2020) Supporting teachers during the COVID-19 (coronavirus) pandemic, MAY 19, 2020, EDUCATION FOR GLOBAL DEVELOPMENT. <https://blogs.worldbank.org/team/tara-beteille> - Accessed 22 February 2020.
- [5] Landemore, H.; Bernholz, L.; Reich, R. (2020) *Digital Technology and Democratic Theory*, University of Chicago Press. Accessed 24 February 2020 <https://press.uchicago.edu/ucp/books/book/chicago/D/bo68657177.html>.
- [6] Santos, B. S. *A cruel pedagogia do vírus*. Coimbra: Almedina, 2020.
- [7] Bernholz, L.; Landemore, H.; Reich, R. (2020) *BOOK: DIGITAL TECHNOLOGY AND DEMOCRATIC THEORYA*. Edited by Lucy Bernholz, H el ene Landemore and Rob Reich , Stanford PACS, Stanford Social Innovation Review
- [8] Magenhan, B. (2020) Joint Research Centre (JRC), the European Commission’s (2020/2024) https://ec.europa.eu/info/departments/joint-research-centre_en Accessed 24 February 2020
- [9] Carr-Chellman, A. (2016). *Instructional design for teachers: improving classroom practice*. 2nd Edition. London: Routledge.
- [10] Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*, 27 March. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>. Accessed 18 february 2021
- [11] Jandrić, P; McLaren, P. (2020) “Critical intellectuals in postdigital times “–First Published October 12, 2020 Research Article <https://doi.org/10.1177/1478210320964372> <https://journals.sagepub.com/doi/abs/10.1177/1478210320964372>
- [12] Collier, A, Ross, J (2020) Higher education after surveillance? *Postdigital Science and Education* 2(2): 275–279.