Interdisciplinarity: Making the Teaching-Learning Process Global and Motivating

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Abstract

The concept and the role of interdisciplinarity in the 21st century teaching-learning process should aim to overcome the rigid compartmentalization of individual syllabus and thus contribute to a more global and integrative education. The formal structure of academic curricula reflects an over-specialization of knowledge that causes an undesirable disconnection of contents between disciplines and, sometimes, within a single discipline. The interdisciplinary approach presupposes a break from more traditional teaching methods. It poses a challenge and requires a behavioural resetting of faculty and students, teacher training, the implementation of new educational policies, and a consequent redesign of syllabuses and curricula. Adequate governance policies, financial incentives, and marketing policies are essential. Though the interdisciplinary approach may seem complex due to the integration of diverse syllabus, disciplines, and individuals from both academia and community, it is a motivating and advantageous pedagogical strategy. The methodology used in this article is to review the literature on this topic, providing a theoretical / scientific framework for the account and analysis of positive experiences conducted and/or observed by the author - a teacher in higher education.

Keywords: Interdisciplinarity; Higher Education; Students; Motivation; Changes

1. The Study

The difficulty in defining the term "interdisciplinarity" is widely recognized, which often has polysemic meanings and makes it difficult to clarify and share ideas, as well as the success of some projects of this nature. For this reason, we believe it is important to base ourselves on a definition and we use one elaborated by Aboelela and coauthors [1] who, based on this same difficulty, carried out a review of the literature on the subject and conducted interviews with researchers to arrive at the construction of the following definition: " Interdisciplinary research is any study or group of studies undertaken by scholars from two or more distinct scientific disciplines. The research is based upon a conceptual model that links or integrates theoretical frameworks from those disciplines, uses study design and methodology that is not limited to any one field, and requires the use of perspectives and skills of the involved disciplines throughout multiple phases of the research process."

Interdisciplinarity is part of the sciences and science teaching area and aims to overcome disciplinarity. It is a buzzword used in the 20th century but the origin of the concept is older. Contextualizing its genesis and designations that referred to this idea as "integration" and "correlation", Klein [2] mentions that the so-called "common curriculum" already existed in the 19th century, although it was only in the 30s and 40s of the 20th century that we could observe its visibility. According to the author, in higher education, in the first half of the last century, in America, educational reforms emerged that followed the line of education based on problems and themes, as well as common curricula were adopted as a reaction to disciplinary over-specialization.

Although there are avant-garde examples in favor of the interdisciplinary approach, in higher education, the impact of tradition, whether in the area of compartmentalization of scientific areas, or in teaching with little or no focus on students, marked several decades and determined certain forms of management and pedagogical approaches that are now obsolete and ineffective. Despite a progressive paradigm shift, there is still often an undesirable separation of knowledge and scientific areas that occurs due to several factors inherent to individuals, for example the fear of change and various insecurities, but also due to external factors, such as heavy institutional structures and educational policies that are out of place and that hinder the interdisciplinary approach. But in addition to the various difficulties that different educational agents face, the advantages of interdisciplinarity are also widely recognized, which in different countries and institutions of higher education are asserting themselves, achieving success and visibility.According to Weingart & Padberg[3], interdisciplinarity is recognized by several universities and academic research policymakers as a condition for the growth of research, even being considered a key factor. In this context, the research centers of universities

that develop good practices, according to an integrative and no longer monodisciplinary approach, increasingly enjoy greater financial emancipation and autonomy in terms of structure and human resources, in relation to the past. Also according to these authors, there are difficulties such as allocation of funds, verifying that: i) interdisciplinary centers can rarely compete, in an institution where the strength and power of departments prevails; ii) the logic of the supremacy of the departments overlaps that of the interdisciplinary centers, recruiting according to disciplinary and non-interdisciplinary quality criteria. Also the criterion of greater "longevity" of the departments is imposed in view of the short lifespan of the interdisciplinary centers iii) the impossibility of the interdisciplinary organizations offering courses and / or diplomas, making the members of these organizations dependent on the departments that organize disciplinary curricula in the logic of its departmental structure; iv) access to employability is organized according to disciplinary logic, with the discouragement of students wishing to choose an interdisciplinary approach, as their career opportunities are scarce and v) reinforcement of disciplinary structures in relation to the modes of accounting and evaluation of higher education systems, for some years.

As an obstacle to a successful multidisciplinary experience Lindvig & Hillersdal [4] point to the danger of an unclear definition of interdisciplinarity at the level of senior management. Referring to the case of the University of Copenhagen, in which none of the most common criteria for improving institutional interdisciplinarity has been applied, such as promoting a collaborative environment or providing incentives to the teachers, they refer to the consequences of such a stance: the consolidation of existing monodisciplinary structures, connoted as stable and safe, instead of introducing new and interdisciplinary approaches. To achieve success in interdisciplinary projects, the idea that teacher training is fundamental and a challenge for the development of core and transversal skills of higher education graduates is shared by several authors (Santos & Silva[5]; Santos, Franco, Leon, Ovigli, & Júnior[6] Santaolalla, Urosa, Martín, Verde, & Díaz [7]). In this sense, Santaolalla and co-authors describe two interdisciplinary projects carried out by teachers and teachers educators (preservice teachers) and primary school children, in the context of interdisciplinary learning from a museum, being proposed, from that experience, an interesting and useful interdisciplinary model for teacher education. These researchers underline the need for study plans to be aligned with pedagogical methods that allow achieving 21st century skills.

With a view to greater success in terms of employability, interdisciplinarity is advised and contact with the work context is valued, as was the case with future teachers. Also in a study on Higher education Interdisciplinary in UK, in which an Interdisciplinary Model (HIM) of best practice is proposed, students are pleased with the possibility of solving problems with their colleagues in an industrial context. It is still mentioned that skills such as teamwork, problem solving and communication are valued Power, & Handleyb [8].

The effort to make teaching attractive, whether for students and the educational community, or for the job market, through advantageous partnerships, are aspects increasingly considered by higher education institutions. Just like any institution that has a marketing platform to please stakeholders, universities also manage their budgets annually to attract new students, to maintain current students and to sell their quality brand, scoring points together industry. Regarding interdisciplinarity, L. J. & Bélanger [9] reflect on this situation, denouncing the harmful lack of clarity regarding the marketing message and / or the classification of the product. Taking stock of the path taken and regarding the much talked about concept, [9] speak of a euphoria of interdisciplinarity, of a later stagnation and of a resurgence, today. Thus, the current situation seems more encouraging - there are more programs designated as interdisciplinary, there are job offers with this dimension, more government financial support, requests from community leaders and more censorship in order to fight against the compartmentalization of academic disciplines. Nevertheless, questions remain that await an answer regarding the nature of interdisciplinarity and the place it should occupy in the structure of universities. In short, reconstituting the path of interdisciplinarity and regarding the worrying confusion about the aforementioned concept.

As described in the literature review, the benefits of multidisciplinary experiences are effective. This will be demonstrate by describing various concrete situations experienced in an higher education context , within a long-term project conducted with fellow faculty members and students in a spirit of commitment and partnership to design multidisciplinary methodologies.

A first formal experience took place one year after undergraduate and Masters' programmes were adapted to Bologna - 2007-08 to 2009-2010. In our capacity as coordinator and professor of an Information Science degree, we worked with the course coordination board to design and implement a remarkable work of interdisciplinary articulation of activities between several disciplines of each curricular year. This bennefited from both the encouragement and collaborative work of faculty

members, at a time when behavioral changes were required by all educational agents. This initiative aimed to adopt more innovative and motivating active learning strategies, providing the teacher with both meadiating skills and a meadiating role in the teaching-learning process and empowering students to become the protagonists of their own learning. Several interdisciplinary initiatives took place involving 1st year students attending the undergraduate programme in *Library and Information Sciences and Technologies*. The experiments occured during thre consecutive academic years and involved the classes of Introduction to Information Science and of Information Research Methodology. Students were invited to conduct research on topics within the syllabus of *Introduction to Information Science* and asked to apply the skills acquired upon, while attending Information Research Methodology course : *i*) the correct structuring of the work, *ii*) the quality of information sources, *iii*) the techniques of academic writing, *iv*) the processes of bibliographic citation and referencing, *v*) the organization of bibliographies, *vi*) the application of studied citation styles and bibliography. All of these items, which had been formally assessed, should be based on the ethical use of information.

During 2008-09, students were also challenged to write a single paper for two 1st year classes - *Organizational Communication Technologies* and *Information and Communication Technologies*. Students were asked to create a website, with the collaboration of the ICT teacher. Our role, as the Communication teacher, was to monitor the contents (texts) created by students for publishing on the website, monitoring and supervising the correct coding of ideas and the adequacy of the texts (written expression) to the target-audience and the organisational context. Within the same higher education institution, the undergraduate programme in Hotel Management developed an interdisciplinary project, adopting an identical strategy involving all classes within the course. Our contribution, from 2009/10 to 2015/16, was directed to 2nd year students attending French as a Foreign language Level 2. In this case, there was amore direct interaction with the ICT teacher who supervised the students as they constructed of a website for a fictitious hotel. The Communication teacher conducted a permanent supervision of the students' translation to French of the website contents - originally produced in Portuguese. More recently, in 2019-20, we implemented another interdisciplinary project involving the undergraduate programme in Library and Information Sciences 2nd year classes of Technology and Information Policies (TIP), Informational Behavior (IB) and Theories and Methods in Communication and Information Sciences (TMCIS) Technologies between three 2nd year subjects - the two latter under our scientific and pedagogical supervision. This project involved two lecturers and a class of twenty students. The investigation was carried out in groups and addressed the identification of information and technology policies being used by the information services of Porto Polytechnic - of which our facuty is part of. The group-work integrated objectives related to syllabus and skills developed in all the three classes. The assignement included both a theoretical as well as an empirical component - an autonomous visit by each work-group to a library of one of the Schools of Porto Polytechnic to ask the service users to answer a questionnaire and to conduct an interview to the librarian. The assignement also required witing a paper – students received clear instructions regarding the structure of a scientific article. In the scope of the evaluation of the works, we highlight the very positive results achieved by the students.

Table 1 - Results obtained in the interdisciplinary project (2019-20)

ECTS grading scale	Portuguese grading system (0-20)	Grade	N	%
C	Good (14-15)	15	4	20%
B	Very Good (16-17)	16	4	**20%**
		17	8	**40%**
A	Excellent (18-20)	18	4	20%

According to the Application of the European Classification Comparability Scale of Instituto Superior Técnico de Lisboa and the Decree-Law No. 42/2005 [10] which approves the regulatory principles of instruments for the creation of the European higher education space and regulates the European scale of comparability of ratings (from A to E), the results obtained are between good and excellent. Most, 60%, are very good (B), 20% are excellent (A) and 20% are good (C). Therefore, 80% of the results correspond to a score equal to or greater than very good and there are no ratings below good,

that is, Sufficient - 10-11 (E) nor Satisfying - 12-13 (D). Regarding the final classification of the two classes under our scientific and pedagogical supervision, we observed that the result of this academic work did not induce the overall final grade average to lower. Our analysis reveals the opposite: in the discipline of TMCIS, the majority of students (65% -13 individuals) increased their average grade by one value while in IB, 35% (seven individuals) of the students increased their average grade by at least one value, with one of the students increasing the average grade by two values on a scale of 0-20. In conclusion, the analysis of the interdisciplinary experiments reveals that the interdisciplinary approach led to a valorisation of the students' autonomous work, encouraged research choices based on credible sources of information, promoted team working and academic writing skills. These pedagogical strategies were deemed positive because they became more motivating and time-effective for the students, preventing them from dispersing on the study of different topics, promoting the adoption of active and proactive postures, developing skills, taking pleasure from their learning and, in some cases, better academic achievement.

There are reasons to think that, despite the difficulties described, interdisciplinarity should not be understood as a buzzword, it should be implemented with courage in the daily lives of higher education institutions. Combating the monochord of disciplinary teaching and bringing open thinking and global training to students, it will be more successful if several synergies and bridges are built inside and outside the walls of universities.

2. References

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