

Pedagogical Innovation and Distance Education in Higher Education in the (post-) COVID era

Perpétua Santos Silva

Polytechnic Institute of Santarém, Portugal
CIES_ISCTE Centre for Research and Studies in Sociology
perpetua.silva@ese.ipsantarem.pt

Marisa Sofia Monteiro Correia

Polytechnic Institute of Santarém, Portugal
Quality of Life Research Center, Portugal
marisa.correia@ese.ipsantarem.pt

Abstract

The COVID-19 pandemic highlighted the urgent need for higher education institutions to promote pedagogical innovation. Although it is evident that distance learning is different from emergency remote teaching, this crisis response provided a good opportunity to acknowledge the benefits of distance education. However, for an effective and sustainable change it is essential to identify the key success factors of distance learning. This paper presents the main contributions of a research related to the transition from face-to-face to remote education, carried out in a Portuguese Higher Education School during the COVID-19 pandemic, that explored college students and teaching staff acceptance of emergency remote teaching. From a methodological point of view, we followed a quantitative approach with the application of two questionnaires, one to the students and the other to the teaching staff. We have identified some constraints faced by the respondents, but also a set of factors with a positive impact on distance education success: access to technological resources, digital skills, work conditions, heavy workload, and learning environment; flexibility, guidance, and interaction; assessment criteria and practices are some examples that will be discussed in this paper. Findings from this study enhance the discussion around dimensions such as pedagogical innovation and the development of teaching staff digital skills. Additionally, findings revealed openness of professors and students to adopt distance learning in the future. Finally, these conclusions contribute not only to improve institution's study programs, but also to pave the way for the creation of new ones in distance learning modalities (b-learning or e-learning).

Keywords: COVID-19 pandemic, distance education, emergency remote teaching, higher education, pedagogical innovation.

1. Introduction

There has never been so much interest in discussing pedagogical innovation, digitalization, and online learning in higher education as in the last two years. Although digital transformation of higher education institutions has been considered a priority for years, the COVID-19 pandemic has accelerated this process (e.g., García-Morales et al., 2021). Unlike pedagogical changes from face-to-face teaching to blended learning or fully distance learning, this sudden imposed shift caused by the COVID-19 pandemic was unplanned (Iglesias-Pradas, 2021) and the vast majority of students and faculty member had little background or prior experience in distance education (Stewart & Lowenthal, 2021). The disruption caused a great impact in the way most higher education institutions deliver their courses (Iglesias-Pradas, 2021), especially in practice disciplines such

as medicine, laboratory science and nursing (Klemm et al., 2020). However, according to a UN policy brief (UN, 2020) the migration of learning activities to distance learning has been an opportunity of many higher education institutions “to expand flexible learning modalities, setting the stage for a sustained shift towards more online learning in this sub-sector in the future” (p. 12). In this context, this article reflects on the opportunities and challenges that students and faculty members from a Portuguese higher education institution foresee in the abrupt migration of the learning process that occurred in 2020.

1.1. **Pedagogical innovation and distance learning in higher education**

In the past decades higher education systems have been pressured to boost pedagogical innovation to meet the challenges of technological developments and preparing citizens in an increasingly complex society (Canals, et al, 2019). Some authors like Gilbert et al. (2021) say there’s a need for pedagogical innovation in today’s higher education which is supported or constrained on five dimensions: the teacher, the institution, colleagues, students and the teaching environment. Even though it’s difficult to find in the literature a clear definition of pedagogical innovation, it requires a “one-off, measured and sustainable positive change” (p. 196, Walder, 2014).

According to a study developed by Walder (2014), there’s a recurrent confusion in faculty members between technological innovation and pedagogical innovation that needs to be clarified. Salmon (2005) stated that this demanding endeavour will not be achieved by learning technologies alone because academic staff are reluctant to change the methods of teaching without fully understanding the resultant benefits. Referring to the specific case of distance learning, this author adds that staff with no experience in e-learning wrongly focus on technology rather than pedagogical innovation. Nevertheless, in the literature is consensual the benefits of distance learning by creating “interactive learning environments that are student-centred and offer personalised learning” and preparing “graduates for a globalised world of complex systems and rapid change” (p. 383, Rospigliosi, 2020).

Some authors envision that COVID-19 brought insights to boost pedagogical innovation as online and blended learning proved to be a successful way of delivering courses (Agasisti & Soncin, 2021; García-Morales et al., 2021; UN, 2020). Besides, this crisis context provided the opportunity to higher education institutions to be abreast with the rapid emergence of new technologies and enhance students’ learning experience in a digital immerse environment (Ali, 2020; García-Morales et al., 2021).

1.2. **Emergency remote teaching constraints and opportunities**

The crisis-response migration of learning methods adopted in higher education institutions is very different from a properly planned and developed online learning rooted in effective theories and models and, therefore, it can only be seen from the perspective of emergency remote teaching (Adedoyin & Soykan, 2020). Although some institutions seemed better positioned to respond to urgent migration of learning processes, due to their previous experience with fully or hybrid courses (Bartolic et al., 2021), many institutions have implemented rapid responses that mistakenly involve technologies as if they were distance learning experiences (Hodges et al., 2020). According to the authors, the quality of online learning has long been questioned, despite research showing quite the opposite, and the cluttered transition to online learning due to the pandemic crisis can consolidate this mistaken perception. Baggaley (2020) called it a reputational damage to distance education during and after COVID-19 era.

In the past year many articles focused on the constraints and opportunities of emergency remote teaching in light of COVID-19 pandemic. Drawing on specific literature, we describe the constraints identified by the main agents involved in the process: students and faculty members. First, technology was pointed out as one major

challenge for higher education institutions across the globe, obviously, because online learning is entirely dependent on technological devices and the internet (e.g., Adedoyin & Soykan, 2020). Besides the need to improve technological infrastructure in higher education institutions, staff members need to have the capacity to use them effectively (Ali, 2020; Lapitan et al., 2021; Muthuprasad et al., 2021). From the teachers' perspective, this forced transition to online learning was highly demanding without the proper skills (Govindarajan & Srivastava, 2020; Dwivedi et al., 2020) and clear guidelines from the institution about their new role and workload (Guangul et al., 2020). Teodorescu et al. (2021) highlighted that much of the support given to instructors focused on the technology tools and there were limited training opportunities on how to integrate these tools and develop adequate online learning activities which contributed to a lower perception of the quality of the online courses. Furthermore, Aguilera-Hermida (2020) study demonstrated there's a need to train students in new technologies.

Digital competence of both students and instructor has an impact in the effectiveness of online learning (Adedoyin & Soykan, 2020), however, Kulikowski et al. (2021) study determined that reciprocal communication between teachers and students had a higher influence on students' satisfaction regarding emergency forced pandemic e-learning than technological concerns. Another study focusing on college students' use and acceptance of emergency online learning, developed by Aguilera-Hermida (2020), also confirmed that the lack of interaction was a motivating factor for students, especially because they did not choose to pursue an online or hybrid program. Moreover, the author emphasized that "accessibility is crucial for a successful online learning experience (...) accessibility is not only related to access to the internet or a device, but it is also related to the number of people living in the same house" (p. 6, Aguilera-Hermida, 2020). In fact, students and teachers' working environment may cause disruption during the online teaching and learning process (Adedoyin & Soykan, 2020). Another factor that has an undeniable impact on students' performance during Covid-19 pandemic is socioeconomic background (Adedoyin & Soykan, 2020). Aligned with this idea, Govindarajan and Srivastava (2020) stated that online education amplifies the digital divide.

The forced adoption of online learning brought some issues related to the learning process, namely assessment, heavy workload of the instructors, and compatibility (Adedoyin & Soykan, 2020). The latter aspect refers to the fact that the transition to online learning was quite smooth in social science and humanities courses but highly problematic with sports sciences, engineering and medical sciences that rely on hands-on instructional activities (Adedoyin & Soykan, 2020; Klemm et al., 2020). Buttler et al. (2021) determined that the greatest factor that influenced students' perceptions of the shift to emergency remote teaching was the support provided to students to complete learning activities (e.g., assignments, timely feedback, and consistent communication). Still related to the learning process, students' also revealed concerns about the format of the final exam, the learning schedule and the Learning and Management System (LMS). Bozkurt et al. (2020) refers that online learning brought an urgent necessity of rethinking assessment methods and concerns about surveillance, ethics, and data privacy. Conducting assessments remotely was particularly challenging for teachers due to academic dishonesty and the lack of preparation and infrastructure (Guangul et al., 2020). Some studies highlighted problems in maintaining students' interest and engagement during online classes (Lapitan et al., 2021; Mishra et al., 2020) and students missing lectures (Mouchantaf, 2020).

Organizational readiness during the pandemic crisis, as demonstrated in Iglesias-Pradas et al. (2021) study, contributes to successful implementation of emergency remote teaching and, consequently, to students' academic performance. Besides individual and instruction-related aspects, the authors concluded that aspects related to the institutional response like technical infrastructure support, informal communication channels, and the development of digital skills of faculty members have a positive effect in adapting teaching. Similarly,

Kulikowski et al. (2021) study revealed that students' idea of a disorganized institution during this crisis is strongly related to a negative perception about e-learning. The lack of institutional help and training emerges as a frequent challenge mentioned by faculty members in many studies (e.g., Mouchantaf, 2020). Finally, Agasisti and Soncin (2021) concluded that higher education response to COVID-19 was only successful, because of community engagement.

Findings from a survey applied to 1148 academics in universities in the UK reported an abundant number of what the authors called 'afflictions' that can be associated with emergency online migration that overshadow the potential benefits. However, respondents recognized some 'affordances' of digital pedagogies, like the importance of acquiring skills and expertise for the evolution of universities' digital provision and what was frequently considered as a constraint that is a more controlled environment of teaching from home. In effect, this situation created an opportunity for teachers to improve their digital literacy and at the same time, for some of them, to embrace online pedagogy (Yang & Huang, 2021). From students' standpoint, online education during COVID-19 was found to be advantageous for its flexibility and convenience for the learners (Muthuprasad et al., 2021). Oliveira et al. (2021) characterized the educational process of several higher education institutions in Portugal and Brazil during the COVID-19 pandemic through students' and teachers' perspectives and one major conclusion was that there was an increase in teacher-student interaction.

The study by Seabra et al. (2020) involved 26 professors and 38 higher education students, whose activities prior to the pandemic took place in full or in part, in face-to-face modality. The results of this study pointed to a convergence in the perspectives of teachers and students and to an emphasis on synchronous practices. Despite sensitive aspects such as evaluation, student involvement, practical activities, technical issues or time management, all stakeholders recognized the advantages of emergency remote learning. For example, teachers pointed out as strengths the involvement of students (also mentioned as difficulty), the increase in teacher/student proximity and the learning of new methodologies. In addition to this, students also confirmed those ideas and expressed interest in maintaining the learning model (at least in part). The researchers conclude that time/workload management could be a key element in ensuring the sustainability of online learning initiatives.

For Yang and Huang (2021), COVID-19 experience brought positive insights for the future of universities so that the teaching process can be more centered on students. Likewise, Agasisti and Soncin (2021) refers that this experience had a positive effect towards innovation and improvement of teaching and administrative tasks. This experience can be advantageous to change the prevailing depreciative view of online education and for diversifying the learning process (Martins et al., 2021). To overcome the problem of adapting practical courses to online settings, faculty members had to rely on remote simulations and develop demonstration videos (Klemm et al., 2020) that enrich the existing pedagogical resources even when returning to the face-to-face system. Additionally, COVID-19 forced the use of remote assessment techniques which entails discussing with students' academic integrity issues and ethics through the learning process (Guangul, et al., 2020).

Regarding institutional matters, COVID-19 outbreak provided an opportunity to build a training system of digital pedagogy capability for teachers and the promotion of international cooperation in education at a lower cost (Yang & Huang, 2021). Like García-Morales et al. (2021) emphasized "the disruptive impact of COVID-19 and the digital technologies that can support online learning is an unprecedented opportunity for the transformation of higher education at a global level" (p. 6). This crisis is an awakening call for the need to prepare all stakeholders with new skills and values (Oliveira et al., 2021). Finally, Adedoyin and Soykan (2020)

discussed that this sudden response of higher education institutions created a great opportunity for research advancements in order to provide solutions to meet important challenges of online learning:

(a) the need to provide models to accommodate the contemporary changes in online learning, (b) review the process of digital transformation of institutions, (c) designing of more scalable and personalized online learning models, (d) designing of online learning model that will reduce the workload on the instructors, (e) redesign the learning process. (p. 7)

2. Method

Given the novelty of the object of this study, such as ERT during the coronavirus pandemic; and the need to know more about the topic, we choose to use exploratory research (Swedberg, 2020).

2.1. Participants and research setting

Superior School of Education of Santarém is one of the five schools of Polytechnic Institute of Santarém (PIS), a city about 90 kilometres north from Lisbon, the Portuguese capital. In the school year 2019-20 over 595 students attended 1st and 2nd cycle degree (Bachelor's and Master's degree) programmes.

PIS suspended face-to-face classes from March 16, and only reopened the following academic year. The transition to online classes occurred almost immediately but it was a very tough process owing to the lack of experience in offering online courses. At that time, few academic staff possessed the appropriate pedagogical skills to implement ERT and/or use some of the three platforms available (Zoom®, Microsoft Teams® and Moodle®).

In that context, it was urgent to identify through students' and teachers' perspectives constraints of this experience to plan strategies to overcome them; and opportunities to promote the desired pedagogical innovation and digital transformation of higher education institutions. Therefore, we developed a survey to be applied to all students of PIS with the approval of the head of the institution. The Pedagogical Council of the Superior School of Santarém required our help to understand teachers' perceptions on ERT, accordingly another survey was developed. Because our sample in the second survey was limited to one of the schools of PIS, this article only presents the data analysis of the first survey referring to students from that school.

108 students responded to the questionnaire of a total 595 that were attending a master, a bachelor or a professional course program in the academic year of 2019/2020. More than a half of the respondents (53%) were new students, who were admitted in Fall 2020, and only 13% were in the last year of the programme (Bachelor – 9; Master – 5). The majority of the respondents were undergraduate students (74%), 23% were enrolled in graduate programmes and the remaining were attending professional courses.

The 33 teachers that responded to the questionnaire, about 60% of the total of the academic staff of the institution, are from different fields, such as social sciences, science and mathematics, education and curriculum, languages and literature; and arts. We emphasize that 54.5% of the teachers reported they were teaching Curricular Units they have never taught before, which implies an increased effort in the preparation of classes; also, to note that 48.5% of the teachers were teaching 4 or more different curricular units (one of which taught eight).

For both students and teachers, the representation according to gender corresponds to the distribution that we can find in the School, in which there is an over-representation of women in relation to men. Aged between 25 and 65, more than half of the teachers are over 45 years old (54.6%). Considering the students, their ages range from 18 to 60 years old; the average age of the students who answered the questionnaire is 26, with a median of 21 years old.

2.2. Procedure and Instrument

Both surveys were constructed using the online tool GoogleForms® and disseminated via email. All participants were informed about the research objective, and participation was voluntary. Participants responded anonymously, and confidentiality was guaranteed. The first part of the questionnaires was composed of closed-ended questions, some of them Likert scale type. The questionnaire also included two open-ended questions about the challenges and opportunities of ERT in the students' and teachers' perspectives.

Students' survey was launched on the 14th May 2020 and remained open for six weeks. The 29-item questionnaire administered to students had five sections: section 1, general information; section 2, working conditions; section 3, ERT experience; section 4, remote assessment; section 5, challenges and opportunities of ERT. A total of 99 students answered the last question reporting challenges and 94 reported opportunities related to ERT.

Teachers' survey was available between the 18th and 30th of May. The questionnaire had 40 questions organized into five sections: the first section required demographic information such as the teacher's age, department, number of courses being taught, number of students, and working conditions at home (e.g. number of children); the second section focused on teachers working conditions in ERT; the third section explored the participants' views on ERT; the fourth section intended to find out which resources and learning activities were used by the participants; the last section, consisted of identifying challenges and opportunities of ERT. A total of 31 teachers indicated positive aspects and constraints of ERT.

2.3. Data Analysis

The data was analysed using SPSS version 24.0. Descriptive statistics were generated to better grasp the participants' demographics including frequencies. The open-ended questions were analysed using grounded theory (Strauss & Corbin, 1994). Data were analysed and after that, the categories were grouped into themes.

3. Findings and Discussion

As it has been happening all over the world, and in line with other studies, we were concerned about the impact of the COVID-19 pandemic on the quality of the teaching learning process in our institution, aware of the different circumstances and contexts surrounding these processes and the social conditions of existence of those involved.

One important dimension analyzed relates to the remote working conditions for both teachers and students (Figure 1).

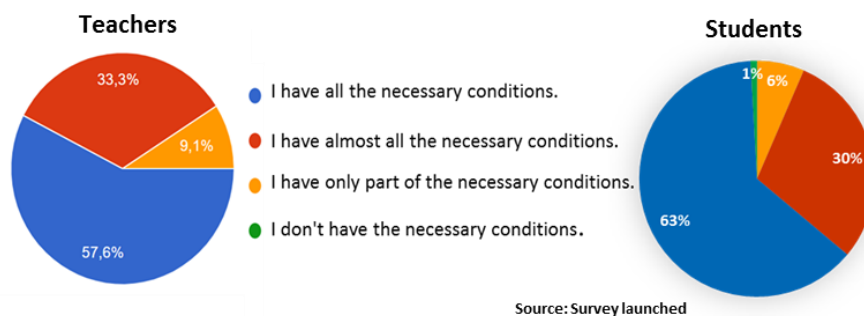


Figure 1: Representations of teachers and students about their remote working conditions.

We can say that their representations are quite satisfactory, with more than half of the teachers as well as students stating that they have all the necessary conditions (57.6% and 63.0% respectively) or almost all the necessary conditions (respectively, 33.3% and 30%) to develop their work remotely. Only one student reported not having the necessary conditions to continue studying in a remote learning modality.

Looking at the results obtained in relation to technological resources, in general, there do not seem to be major limitations. However, a finer analysis of the information reveals some discrepancies (Table 1).

Table 1: Resources & work environment

	Teachers		Students	
	N	%	N	%
Resources				
Unlimited access to the internet at anytime	32	97.0	95	88.0
Conditional access to the Internet	1	3.0	13	12.0
Own computer for exclusive use	30	90.9	87	80.5
Shared computer	3	9.1	18	16.7
Tablet	3	9.1	22	20.3
Smartphone	31	93.9	96	87.1
Microphone	31	93.9	93	89.8
Webcam	31	93.9	97	86.1
Access to online resources	31	93.9	96	88.9
Work environment				
Private workspace	20	60.6	22	20.3
Quiet workspace	24	72.7	74	68.5

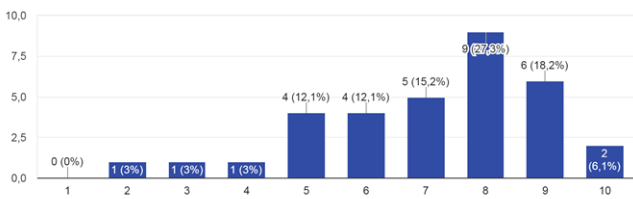
Most of the teachers said they have unlimited access to the internet (97.0%) and their own computer for exclusive use (90.9%); other technological resources such as smartphone, webcam and microphone are also available to the vast majority of respondents whether they are teachers or students (Table 1). Considering the quality of their internet connection during videoconference classes, on a scale of 1 to 10 (from lack of quality to very good quality) 45.5% of the teachers rate the quality of their connection as very good and 54.5% as good. It should be noted, however, that as far as students are concerned, the figures are lower than those for teachers in almost all items: unlimited access to the internet (80.5%); a personal computer for their exclusive use (88.0%); webcam (86.1%); microphone (89.8%) and Smartphone (87.1%). While these cannot be considered dramatic results, the need to share a computer (12.0%) and the reference to conditional access to

the Internet (16.7%) as well as difficulties in accessing the internet (17.6% often) indicate different realities among the students that place them in a situation of inequality in accessing quality education.

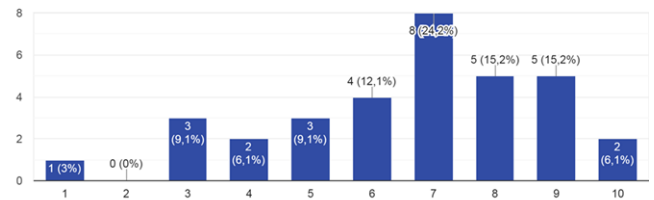
In terms of the environmental context, conditions worsen for both groups but, again, particularly for students. About 80% of the students cannot work in a private place even though 68.5% of them stated that they have a quiet place to carry out distance learning activities. The overwhelming majority of students were in three-person (35.2%) or four-person (32.4%) households. Some students were also in charge of looking after younger siblings and supporting grandparents during the remote learning period. The well-known implications of the pandemic and the great impact it has on the management of daily routines are especially acute for those who have dependents under their care, namely children, school-age youth, and the elderly. With all schools and support facilities for the elderly closed, and the need for permanent monitoring of children's school activities, the conciliation between family and professional life becomes more complex, contributing to an increase in workload, a fact that was significantly highlighted (by 84.8% of the teachers and by 89.8% of the students). Regarding teachers, 63.7% indicated that they have dependents under their care: aged 12 years or less (36.4%); aged over 12 years (18.2%); and some cases with elderly dependents were also pointed out (9.1%).

As we know (Glass, 2017; Hermann 2013) previous experience in distance education influences teachers' attitudes and their representations about this teaching-learning modality. In the case of the School under analysis, 54.5% of teachers stated that they already had experience in distance education but still 57.6% took the opportunity to participate in training initiatives that particularly focused on: online learning methodologies (50.0%); online assessment (tests, exams, etc.) (39.9%); digital tools (38.9%); Moodle platform (22.2%); others (11.1%), such as cybersecurity, impact of the pandemic on HEI, etc.

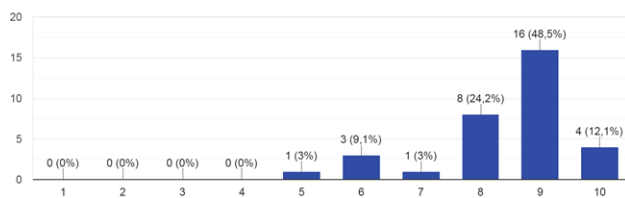
How do you rate your domain on digital technologies before confinement?



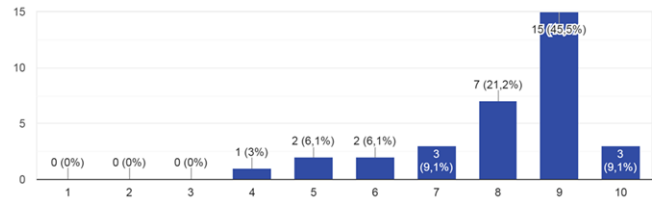
How do you assess your mastery of distance learning methodologies before confinement?



How do you rate your domain on digital technologies after confinement?



How do you assess your mastery of distance learning methodologies after confinement?



Source: Survey launched

Figure 2: Digital technologies and distance learning methodologies (Teacher's rate).

Teachers also state that this experience forced by the pandemic, despite implying a considerable increase in workload, has broadened their knowledge about methodologies and digital technologies to support online learning. The results converged with Gonzalez's (2013) perspectives that training should focus more on methodologies and less on digital tools. Overall, teachers' perspectives show that the transition to distance

learning led to many challenges due to an adaptation of procedures, resources, and didactic strategies in a short period of time. However, the experience expanded their knowledge about digital technologies and methodologies to support remote learning (Figure 2). Teachers evaluate positively the evolution of their competences throughout the remote teaching period; both regarding the mastery of digital technologies and teaching methodologies the median increased from 7 to 9, which reveals promising representations regarding the educational modality experienced, for some, for the first time.

Concerning students, 88.0% state that their knowledge of work platforms and tools has improved. However, there are some aspects that deserve better attention. Considering the perception of their own performance and development of competencies, although globally they present a positive self-assessment about the ability to do teamwork (76.0% disagree that this ability has worsened), about the ability to perform autonomous work (74, 9%) and about the development of working methods (67.5% consider that they have developed new working methods and 56.5% consider that they have developed more efficient working methods) it is worth reflecting on the fact that so many students indicated that they had worsened in their ability to do teamwork and also in the development of working methods - which is indicative of the need to train these students in work methodologies (whether distance or face-to-face) carried out in a collaborative way.

In the School of Education, the Moodle platform as a management platform for teaching-learning activities has been used, although not in a generalized way, for about a decade as a support to face-to-face teaching activities. Therefore, there is some knowledge and experience in its use by both teachers and students and it was hoped that in this remote teaching period this pre-existing familiarity could have been harnessed. Thus, the students were questioned about their level of satisfaction regarding the asynchronous activities developed using Moodle, and it was verified that 92.6% evaluated positively the work done (satisfied: 39.8%; very satisfied: 52.8%). Considering the contact with teachers, although the degree of satisfaction of students remains positive (70.4% declared themselves satisfied and very satisfied), it is possible to verify that it decreased in relation to the other indicators evaluated, with students emphasizing, in the open questions, the need for greater feedback in some curricular units in particular, the importance of interaction taking place in an organised and planned way and the importance of information becoming available more promptly.

Also, in relation to the online assessment activities a lower level of student satisfaction is identified. Although 47.2% consider themselves satisfied and 13.9% very satisfied there are 31.4% of students that stated they are dissatisfied and very dissatisfied with online assessment tasks (8 students indicated that online assessment does not apply in their cases). The analysis of the activities on the Moodle platform that teachers identified as taking place in their curricular units shows that only the forum (57.6%) and work/assignment (60.6%) activities are significant - it is not possible to know the pedagogical intention of their use, so we may be only in the presence of a version limited to the dissemination of information in the forums and the submission of papers online. All other activities that the platform allows to develop (wikis, databases, portfolios, glossaries, workshops, H5P, etc.) are mentioned very rarely. As for online assessment, students referred the performance of collaborative activities (48.5%), project work (60.6%), the presentation and discussion of work (57.6%) and the resolution of exercises (39.4%). Again, we were unable to go into the methodologies used in these activities in more detail, but crossing the quantitative and qualitative information and knowing that a decision was made at the top to only allow 25% of the teaching sessions to be held in an asynchronous mode, it is plausible to infer that we are in the presence of synchronous activities carried out through the zoom platform.

When questioned about interaction with their peers, the majority of the students (79.1%) stated that they contacted their colleagues every day or almost every day in the context of school activities, namely to carry out group work; 11.7% indicated that they did so once or twice a week and 9.2% rarely or never.

Like students, teachers also indicated developing joint work with their peers. Many of the learning activities were designed collaboratively, particularly among colleagues sharing course units (78.8%). But there was also interdepartmental articulation (45.5%), with other departments (24.2%) and with other schools (12.1%), reflected in the collaborative construction of educational resources (60.6%). Although we were in confinement, as demonstrated by students and teacher's interaction was possible as well as the development of joint work. These results seem to contradict those achieved by Mansback and Austin (2018) highlighting the feeling of isolation associated with the online teaching modality.

Nevertheless, there were many challenges faced and difficulties to overcome. The main challenges pointed out by teachers and students were grouped into three major categories: 1) related to students' constraints (24%); 2) related to teachers' constraints (58%); and 3) related to the teaching-learning process (100%).

In the first category, teachers highlighted concerns related to students' inadequate technological equipment, Internet access and some situations of digital illiteracy; difficulties in time management, namely in the case of working students, and in reconciling personal and academic life. Social heterogeneity also emerged among the teachers' concerns, with focus on the socio-economic conditions of a group of international students.

The students highlighted practically the same aspects as the teachers, and reported feeling demotivated and having difficulties in concentrating, which impacted on their learning processes.

The second category, regarding teachers' constraints, the challenge mostly indicated was the workload increase, pointing out difficulties in reconciling work with personal life and, also, the availability of technology resources. There were some statements about the insufficient proficiency in the use of digital tools to support online learning, the negative impact of this transition on the scientific production of teachers and the lack of training in online teaching-learning methodologies and digital assessment tools. These concerns are transversal to both groups surveyed, with students particularly highlighting the need for more training in distance education and assessment for teachers.

In the third category, about the challenges related to the teaching-learning process, the adaptation to new teaching methodologies, the concern with the impossibility of carrying out laboratory and field work and the difficulty in finding alternative ways to replace them, as well as the impossibility of conducting in-person internships were the most relevant aspects pointed out by the teachers. For students, the concern that stood out the most is related to the volume of work requested; mentioned the feeling of lack of guidance and feedback, communication between teachers and students. They highlighted the planning and adaptation of methodologies in the organization of the curricular units.

Nevertheless, several advantages of online education were also recognized. In the first category, related to students, teachers identified online learning as an opportunity to strengthen students' autonomy and involvement; for pedagogical innovation and the development of new learning methodologies. In the teachers' view of the opportunities offered by online learning, the impact at the institutional level was also highlighted. After this experience, teachers showed willingness to adopt distance learning or hybrid (b-learning) in the future and recognized the advantages of diversifying study programs into new learning modalities.

The students highlighted the flexibility of managing time, spaces, and the rhythm of work and learning (favoring reconciliation between different spheres of life). They saw distance learning as an opportunity to expand knowledge of digital tools and to develop new working methods (useful for future professionals).

Concerning themselves (second category), the teachers claim possibilities of training on methodologies in distance education, point out the importance of work and sharing among peers, show willingness to develop and deepen knowledge about distance education and digital tools. In relation to opportunities related to teachers, there is no reference by the inquired students.

With regard to opportunities related to the teaching-learning process, teachers view as positive the possibilities of organizing the teaching-learning processes, enhancing new work methodologies and innovating from a pedagogical point of view, with the creation or adaptation of materials and the production of educational resources, namely audiovisual/multimedia.

As well as teachers, students consider that this modality of teaching can enhance new work methodologies and pedagogical innovation. They also emphasize the opportunity for communication and interaction between teachers and students pointing out the importance of videoconferences to clarify doubts; however, they emphasize the need to change assessment strategies, criteria, and instruments.

4. Conclusions

Although it is obviously that ERT is different from distance education, the crisis-response provided an opportunity for institutions of higher education institutions to rethink innovation processes and invest in online learning (García-Morales et al., 2021). For instance, according to Adedoyin and Soykan (2020), the challenges experienced during the pandemic can be transformed to opportunities through a process of turning face-to-face instructional activities into hybrid models. Finding a balance between online and on-site will be the real strategic challenge for the future (Agasisti & Soncin, 2021; Muthuprasad et al., 2021). Furthermore, this requires a development of an online learning model that can suit all disciplines to solve the problem of compatibility (Agasisti & Soncin, 2021).

Another important concern emerged in this study, like Aguilera-Hermida (2020) and Rospigliosi (2020) pointed out that, alongside with a range of opportunities created by these pandemic major risks may be widespread, if the experience was negative stakeholders could be mistakenly confused with distance education what can undermine the adoption of online learning in the future. One evidence of that is the reproduction of traditional methodologies using synchronous/real-time online classes and video lectures (Rospigliosi, 2020). Hence this study can bring some important insights to reimagine and redesign the higher education innovation process towards an appropriate view of digital learning and to overcome the identified barriers.

We agree with Eradze et al. (2021), when they state that the pandemic situation led to an experience on a global scale, in different contexts, leading to a "forced digitization". It happened because of a public health issue, therefore without diagnosis, planning or evaluation (namely ex-ante) as the implementation of any development project would require; the now so fashionable pedagogical innovation that considers the inclusion of technological resources and the development of teaching modalities, unloved until just over a year ago, emerging in a forced or even imposed way, cannot evade the need to go beyond the use, even if adequate, of technologies without being structured in pedagogical models that are well conceived and adequate to the

reality and contexts of different higher education institutions, responding to the needs of the various partners and audiences they serve. Returning to Eradze et al. (2021), it is a question of reorganizing teaching and learning activities, as the use of new tools introduces such a need, having demonstrated the potential of educational technologies. For the authors, educational innovation corresponds to a transformative process of education itself, re-imagining practices, but not being misunderstood with technological innovation - although in articulation, they are not the same thing.

Previous research (Aguilera-Hermida, 2020; Yang & Huang, 2021) highlighted that raised proficiency in online learning through the pandemic experience had a significant impact on attitude toward distance education and pedagogical innovation. However, for these gains to be sustainable it is crucial to build a training system for teachers. As Ali stated (2020) to establish an online learning environment it is not only necessary to overcome time constraints and technical problems, it requires a solid preparation of teaching materials and curriculum and assessment knowledge. Thus, in our Institution a large project with public funding is under development, with the aim of, among other things, developing digital inclusion capabilities in the business areas of the Polytechnic Institute. To prepare the academic community for future challenges in times of uncertainty, the Institution is already on its way investing in training its community and being aware that the educative offer in a distance modality implies expanding support teams, both in the development of educational resources, in the development of LMS ecosystems and in their interoperability with other academic services.

According to Mackey et al. (2012), promoting the adaptation of face-to-face teaching in times of crisis is essential to strengthen communication channels between students and teachers; prepare teachers to use distance methodologies; prepare students to work independently and at a distance; and ensure technological resources gained and in different formats. These are also conclusions drawn from the analysis carried out on the information collected through the application of two questionnaires to higher education teachers and students from a Portuguese Higher Education Institution. Although, globally, significant aspects were pointed out in the development of skills and abilities to work remotely and that a set of indicators were positively evaluated, less successful aspects were also identified that should constitute a matter for in-depth reflection in the context of the institution.

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