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# Adaptive Learning Technologies for Higher Education

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# Chapter 7

## Dynamics of Managing the Teaching–Learning Process Online: An Approach Study Applied to the Portuguese Higher Education System Post COVID–19

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### ABSTRACT

*The present chapter aims to explore the dynamics of the online teaching-learning process management. The study is applied to the Portuguese university and poly-technic education system (teachers and students), during the Covid-19 pandemic period, using a properly structured questionnaire. As the method, the statistical treatment of the data collected in the sample for the study and respective analyzes of statistical tests applied. The authors used MAXqda© and SPSS©. The results indicated that majority of students consider the main difficulty to be the interaction teachers and students, on other hand, teachers mentioned that the use of synchronous communication is the most difficult aspect of manage in this teaching modality. These*

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*findings suggest that the opinions of students and teachers regarding the challenges faced during online teaching tend in the opposite direction. Although the integration of information and communication technologies in education is currently on the agenda of educational institutions.*

## **INTRODUCTION**

The present chapter aims to explore the dynamics of the online teaching-learning process management: challenges, strategies and opportunities, a study applied to the Portuguese university and polytechnic education system (Teachers and Students), during the Covid-19 pandemic period, using a properly structured questionnaire. As the method, the statistical treatment of the data collected in the sample for the study and respective analyzes of statistical tests applied, we used MAXqda© and SPSS©. The results indicated that majority of students consider the main difficulty to be the interaction teachers and students, on other hand, teachers mentioned that the use of synchronous communication is the most difficult aspect of manage in this teaching modality. These findings suggest that the opinions of students and teachers regarding the challenges faced during online teaching tend in opposite direction. Base on the finding from qualitative analysis, our goal was identifying the factors that significantly influence participants' experiences with online learning. The results show that despite the challenges and weaknesses by the participants, their participation of online teaching is positive, and several strengths have been identified. It was also found that the opinions of students and teachers do not always converge in same direction, which suggest the experience of distance learning was not experienced in the same way by both groups. The results of factors influencing teacher's experiences during online teaching, and there were clear differences in teaching method preferences. Students showed a preference for distance learning, whereas teachers favored face-to-face classes.

Although the integration of Information and Communication Technologies in education is currently on the agenda of educational institutions, it seems to be difficult to understand technological progress and the network society, exclusively based on existing learning theories. As a kind of response to this need, the notion of connectivism emerged. Connectivism deals with knowledge as something distributed in a network of connections.

According to Khadka et al. (2023), digitally mediated education is part of a new educational ecosystem that has greatly contributed to the reconceptualization of teaching and learning processes. Although it is often associated with technological rationality, the concept of internet-mediated education applied to different contexts of practice reflects the polysemy that characterizes it. In fact, there are different

terminologies for very similar concepts, depending on whether the focus is more on technological aspects or closer to pedagogical potential. When the focus is on the pedagogical, the definitions sometimes focus on teaching, sometimes on learning and sometimes on education, often evidencing a dualistic thinking regarding what Education is and how an educational process is constituted. Therefore, it becomes essential to reflect and clarify the terminology and associated concepts in order to facilitate the adoption of a particular concept.

During the pandemic, students might have suffered from negativity due to social isolation and a lack of physical interaction with peers and teachers (Adnan & Anwar, 2020).

The concept of Open learning has focused on the concern with a system where student participation is free from traditional academic requirements. Learning and assessment objectives should serve as a basis for student decision-making. This philosophy of education aims to help students take responsibility for their own learning, whether for study, employment, or simple personal satisfaction. An example of Open learning are MOOCs (Massive Open Online Course). A MOOC is an online course that is freely accessible to anyone and where, normally, no prerequisites are required. Includes open course materials and opportunities for student interaction and collaboration. This happens because these are courses that give the student the freedom and time to take the course at their own pace, without scheduled sessions, whether in person or remotely. Some students like to choose the days they want to see the content, without pressure. In this case, each student can start a course that only has a deadline to finish. A MOOC allows freedom of access and commitment that is not always possible in an eLearning course in which the teacher sets a collective rhythm for the class.

According to Twist (2021), in 2020, with a *pandemic beginning time* with leading to worldwide school closures and educational disruption, a lot of authors starting to development and produced researches and study about the 'changing times' of the title anticipated a focus on innovative assessment developments, assessment of non-traditional constructs, e-assessment and reappraisals of equity and assessment concerns, with an international perspective on how these are influencing educational policy and practice in different ways around the world.

The coronavirus pandemic has caused a shift in how many teaching, learning and research activities are conducted internationally. Lockdowns compelled all education sectors, including higher education (HE), to adopt a variety of online learning practices at short notice. As these changes in practice have implications beyond the pandemic, more needs to be understood about settings across the globe where the move to online may pose particular challenges. (Ayodele & Fatimah, 2023).

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With the Covid-19 pandemic, Universities and Schools had to quickly implement operational teaching-learning strategies outside the traditional context/matrix, investing in hybrid systems, distance learning, and/or a combination of both, e-learning and e-learning, b-learning.

The present study aims to explore the dynamics of the online teaching-learning process management: challenges, strategies and opportunities, a study applied to the Portuguese university and polytechnic education system (Teachers and Students), during the Covid-19 pandemic period, between the months of September 2020 and December 2020, using a properly structured questionnaire. There was statistical treatment of the data collected in the sample for the study and respective analyzes of statistical tests applied.

In terms of organization, this article is structured as follows: firstly, a brief introduction is presented; Then, in the second section, the literature review is presented regarding the issue, where the following are addressed: Dynamics of the online teaching-learning process, the Teacher-student relationship in the virtual environment, Technological tools and resources; the third section presents the Online learning challenges, Motivation and self-discipline of students, Academic integrity in the virtual environment; in section four, they present the Strategies to improve the online learning experience, Pedagogical methods adapted for digital, Promoting interaction and engagement; in section five, the Emerging opportunities in online teaching, Blended education and the future of teaching, Expansion of access to quality education are presented; in section six, Comparing the Perspectives of Teachers and Students: Insights and Implications. In section seven, the results are presented; in section eight, the results are discussed and in section nine, the conclusions are presented, highlighting the main contributions of the study, as well as the limitations and future work.

## **DYNAMICS OF THE ONLINE TEACHING-LEARNING PROCESS**

### **Teacher-Student Relationship in the Virtual Environment**

In order to continue educational provision during the Covid-19 pandemic, many education systems switched to some form of Emergency Remote Teaching (ERT) in 2020. In the study proposed by Shauny *et al.* (2022), indicated a lack of learner–teacher interaction, which was attributed to the shortage of speaking opportunities and students’ decreased inclination to interact with instructors. In addition, most participants reportedly experienced few opportunities for learner–learner interaction during online classes. Study findings provided insight into the NAMS’ (newly arrived migrant students) experiences of being suddenly and unexpectedly compelled to

be autonomous learners during ERT. Students' reports suggest that the quality of learner–content interaction may have been compromised by limited learner–teacher interaction in the ERT situation. This draws attention more generally to the importance of interactive learning in the support of NAMS and the need for educators to be empowered to develop interactivity-rich remote learning environments. (Shauny *et al.*, 2022).

Moore and Kearsley (2011) state that Distance Learning is based on a very simple concept: the physical and, sometimes temporal, separation between students and teachers. Based on this premise, it can be said that Distance Learning is linked to a means of communication, as the first alternative that allowed people to communicate, without being face-to-face, was writing.

At the end of the 1990s, with the development of the first Virtual Learning Environments, also known as Virtual Learning Environment, according to Schlemmer (2001, 2002), what we call Distance Education began to emerge, which consists of using the Internet technologies to provide a wide range of solutions that aim to support learning to occur. Distance Education enables learning solutions that go beyond the traditional stimulus-response training paradigms, represented by the empiricist conception and expressed by the provision of training and instruction such as CBT, WBI and WBT. Distance Education is the constant interaction between subjects, technologies and information and there was no reason for EAD to imitate what could be done in the face-to-face classroom, or through the means previously used for Distance Learning.

## **Technological Tools and Resources**

The eLearning concept etymologically corresponds to distance learning mediated by technology (e=electronic; learning= learning). However, like other concepts in education, eLearning is influenced by several intersecting factors. According to Rosenberg (2001), although eLearning is a form of distance learning (EAD), not all distance learning can be considered an eLearning practice, with the author wanting to exclude the first means of distance learning, such as postal correspondence or teaching through television. This justifies the fact that there are several definitions that emphasize either technology and the process of physical separation between the teacher and students, or the learning process, or the media relationship between human and technological factors. In short, eLearning is part of a new educational ecology that has greatly contributed to the conceptualization of teaching and learning. Being a recent concept, the foundations and meanings of its application in an educational context are still diverse. However, eLearning can be considered a natural evolution of EAD and, given technological advances and economic and social transformations, some authors argue that this type of learning will be seen naturally by new

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generations, and does not have to become necessary differentiate it. On the other hand, there is a need to pay attention to the intentionality and instructional design of virtual learning environments so that they meet the requirements and demands of accessibility, inclusion and integration of different contexts in order to promote new interactions and learning, socially relevant and contextualized.

In a recent study carried out by Horton *et al.*, (2023), it was demonstrated that their findings highlight the significance of decisions about the uses of space in schools, including choices in design (e.g. of play spaces) and the distribution of resources (e.g. equipment). Deeper understanding of the interconnections between the school environment, resources and peer relations can help inform efforts to support student wellbeing. (Horton *et al.*, 2023).

Detailed analysis indicated that lecturers' strategies included encouraging students to engage in self-directed learning, as they uploaded learning materials on messaging groups and the college's e-learning platform. However, lecturers felt that the quality of teaching and assessment was compromised by factors including: irregular power supply, poor internet connection, high data costs and some students limited digital skills. A particular concern was students' lack of interaction on the online platforms, which lecturers perceived to result in a more passive teaching and learning process. Lecturers also experienced difficulties undertaking research activities. A range of strategies and implications for the ongoing management of educational activities was discussed. (Ayodele & Fatimah, 2023).

The recent growth in online teaching and learning has increased the prevalence of educators using technology as the medium for teaching. Research on physical face-to-face teaching has demonstrated that educators engage in emotional labor as part of their job. However, there is limited understanding of how emotional labor presents when educators interact with students in online learning environments (Horton *et al.*, 2023). Educators and Teachers performed emotional labor by creating socioemotional presence through professionalism – demonstrated through emotions such as empathy, concern and friendliness; suppressing their emotions during text-based interpersonal communication; and expressing their emotions through word tone and vocal cues. Findings also identified that challenges encountered by educators in efforts at managing and regulating emotions may create tensions that have negative impacts on educator wellbeing (Ayodele & Fatimah, 2023).

This exploratory study extends understanding of how emotional labor is performed in an online learning environment. It highlights three important implications: first, emotional labor and its potential impacts should be considered within institutional structures and inform decisions about how to offer targeted support to online educators; second, staff development interventions should acknowledge that online learning environments involve emotional labor that may differ in nuanced ways from physical face-to-face teaching and ensure that appropriate coping strategies

are discussed and shared; third, there is a need for emotional labor to be regarded as a purposeful strategy in online learning design. (Nyanjon & Naylon, 2020).

## **ONLINE LEARNING CHALLENGES**

### **Motivation and Self-Discipline of Students**

It is evident that the pandemic of Covid-19 has exposed, or brought into sharp relief, fundamental and complex issues to do with assessment and change that predate it and that will continue to be significant in the post-pandemic educational landscape (Twist, 2021).

According to Hoa *et al.*, (2023), here is a recognised need internationally to reduce depression and anxiety among adolescents. As a population particularly sensitive to the amount and quality of social interaction, challenges for young people became magnified during Covid-19, particularly for students from under-represented and marginalised communities across the globe. The same authors, on the study, conducted in Washington State, USA, that sought, via an alliance with students, parents, educators and community leaders, to gain insight into students' lived experiences during the pandemic. It aimed to better comprehend how experiences affected social emotional learning and use this understanding to explore ways of reducing students' mental health concerns.

### **Academic Integrity in the Virtual Environment**

Aware of this reality and the need for this change, educational institutions in general have sought to adapt to this challenge. However, much of the debate arises from traditional views of education, which view technologies and the digital as essentially instrumental. And, in reality, the challenge is no longer just to learn and integrate digital into the educational process, but rather to ensure that citizens evolve from mere consumers to informed and active producers, preparing them for a true digital culture. More than the use of technologies just for their own sake, the discussion must focus on their pedagogical impact and what is understood as “good” teaching and as a factor in promoting quality in learning. There is, therefore, a need to focus the discussion on pedagogy, on emerging pedagogies, and on the impact that these can have on the development of skills for the 21st century. Therefore, if in this context we accept that technologies (audiovisual, multimedia...) are innovative tools for creating dynamic digital learning ecosystems, and that social web tools configure new educational environments, so it is crucial to recognize the need for the



process to be supported by models that allow the production of the skills currently necessary for the success of organizations (Moreira, 2020).

## **STRATEGIES TO IMPROVE THE ONLINE LEARNING EXPERIENCE**

### **Pedagogical Methods Adapted for Digital**

The pandemic of Covid-19, and its legacy, may accelerate the speed or direction of change in educational assessment in ways that are not easy to predict. The discussion of equity above brings us back to our opening considerations about the educational consequences of the pandemic. One of the impacts that many are very alert to is the likely widening of the attainment gap between those who are and who are not economically disadvantaged within a country – increasing inequity. In tackling these global problems, high-quality assessment will have an important role to play in providing robust data to shape, and challenge, the educational policy agendas within and across countries (Twist, 2021).

As pedagogical strategies to respond to the immediate needs arising from the Covid-19 pandemic, we are faced with the implementation and development of the operationalization of distance teaching-learning (online), such as e-learning and b-learning. There was a shift away from traditional teaching strategies towards digital teaching, due to Covid-19 which triggered isolation, and the education sector had to adapt to a new reality.

### **Promoting Interaction and Engagement**

According to Yu *et al.*, (2022), interaction in the classroom plays the key role for cultivating students' 21st century skills. Insufficient breadth of interaction, uneven interaction opportunities, and chaotic interaction existed in many classrooms. With the integration of technology into education, many smart classrooms were built, with one of the aims being to promote interaction.

Many studies have shown that classroom interaction can affect the classroom atmosphere, students' behavior, and the level of engagement, and thus the quality of classroom teaching (Yu *et al.*, 2022).

For interaction patterns in a technology-rich environment, Cirkony *et al.* (2022) mentioned that except for interpersonal interaction, classroom interaction should also include human–technology interaction, human–resource interaction, human–environment interaction, technology–technology interaction, technology–resource interaction, environment–resource interaction, and resource–resource interaction.

At present, many schools have built smart classrooms, but in the process of teaching practice, the role of technology in supporting classroom interaction remains to be explored (Yu et al., 2022).

In some cases, the formation of the consortium represented a significant outcome in itself, providing a meaningful way of gaining understanding of the mental health and social emotional concerns of the students, their families and the other collaborators. Another outcome was the opportunity for students and parents to be at the same table and voice concerns about remote learning, sharing views on how changes affected students' learning and mental health (Hoa *et al.*, 2023).

The analysis of pre-service teachers' experiences offers insight into how aspects of ROL may challenge participant engagement within elements of teacher education courses. It highlights the support that needs to be provided to prospective teachers in order to reduce transactional distance, suggesting that effective course design and instructional dialogue to promote learner autonomy are both crucial to sustainable teacher education in the post-pandemic context (Ruanaaz & Sageeta, 2023).

## **EMERGING OPPORTUNITIES IN ONLINE TEACHING**

### **Blended Education and the Future of Teaching**

To the detriment of globalization, we are witnessing rapid technological evolution and especially in digital technologies, originating and causing changes in society, the emergence of new paradigms, models, assumptions associated with communication processes, in the creation of new teaching and learning perspectives. According to Moreira (2018), digital technological evolution has played a preponderant role in the reconfiguration and reorganization of educational ecosystems and environments. In view of the entire technological revolution that we are witnessing in the fields of teaching and learning, it is imperative to reorganize teaching processes and change the mentalities of the different players in teaching and education, so as to be able to integrate processes as appropriate. in which they create value, that is, they become useful and these hybrid models allow the creation and integration of different learning environments, becoming an added value for the planning and respective management of educational activities. According to Moreira & Horta (2020, p.4) «(...) it is possible to think of a more blended, more hybrid education, namely through processes of sustained innovation, which allow combining different presences (physical and digital), times (synchronous and asynchronous), technologies (analogy and digital), cultures (pre-digital and digital) and, above all, articulate different spaces and learning environments (analogy and digital)».

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The combination of different pedagogical approaches becomes a direct and indirect result of the integration of various resources and differentiated spaces (Moreira & Horta, 2020). In order to maximize the benefits of technological innovation, namely through the use of digital technologies, it is imperative to change the education paradigm, which in itself does not have the capacity to change pedagogical practices. According to Graham (2006), the combination and articulation between face-to-face and distance education emerges as the best alternative, with a connection between the face-to-face classroom and the distance classroom, in a blended learning strategy.

Blended learning presents itself as a dynamic strategy involving various technological resources, pedagogical approaches and spaces, as well as being a complex communication process, where the existence of a dynamic interaction between participants, resources and spaces is fundamental, taking into account the social and teaching dimensions (Moreira & Schlemmer, 2020).

Given the combination of solutions in the practice of teaching and education, the use of different technological resources is fundamental from the perspective of promoting knowledge and practice, as well as allowing different forms of interaction. To understand the enormous advantages of opting for flexible systems such as blended learning, it is essential to present the concepts of hybrid education, digital education and onlife education.

By hybrid education, we understand teaching and learning processes that are built from an anthropocentric worldview supported by action theory and the teaching dimension, based on inventive techniques, models or methodologies and innovative and connective pedagogical practices. Education is built on the integration and/or combination of physical and digital spaces, including the digital space itself.

Digital education comprises the «movement between human and non-human actors who coexist and are in direct communication, not mediated by representation, in which nothing happens to one without affecting the other» (Moreira & Schlemmer, 2020, p.22). In other words, digital education is defined as the integration of teaching and learning processes supported by digital technologies, whether or not they are interconnected and connected by communication networks.

By onlife education, we understand the human character in a hyperconnected reality, attributed to digital education. In other words, digital technologies as well as communication networks cannot be seen only as tools, but also as vectors of the surrounding environment, where they condition our way of being and being, the way we socialize, in short, how we teach, reflecting the experiences arising from the perception of reality and our interactions with it. We can conclude that hybrid models allow the articulation and integration of different learning environments and, at the same time, provide the incorporation of certain important concepts in the planning and management of learning activities, involving different technological resources, pedagogical approaches and times, as well as integration between actor's human

and non-human, with a view to developing innovative and sustainable education processes. We conclude that flexible systems such as blended learning, combining and integrating online and physical environments, provide integrated and inclusive educational experiences, as they integrate the learning environments used with digital technologies or virtual environments, allowing the adoption of promotional methodologies of significant learning. The integration of digital learning ecosystems, incorporating innovative pedagogical practices using technology, can and should increase the quality of teaching and learning (Moreira & Schlemmer, 2020).

Blended learning or b-Learning is an English term that has emerged as one of the most popular pedagogical concepts at the beginning of this 21st century. The term blended learning was first used in 2000 in an IDC document entitled *e-Learning in Practice, Blended Solutions in Action* by Anderson Cushing. The term emerged when the author, after studying the alternatives for creating and developing a training course, suggested that the best alternative would be a blended solution obtained through the combination and articulation between face-to-face and distance education. In fact, initially, the term blended learning was used in this sense, as the link between the face-to-face classroom and the distance classroom (Graham, 2006).

## **Expansion of Access to Quality Education**

In this disruptive vision we understand the current society of digital and networked education that is now emerging globally. Attention must be paid to strategic changes in education and teaching based on new technologies (with the support of digital resources) in order to guarantee high quality standards, to guarantee quality education and training. The necessary organizational changes are often difficult, and arise in painful contexts, as is the case, and imply enormous institutional, personal and collective challenges of adaptation, change, flexibility and, mainly, transformation and innovation. This scenario therefore requires that after this period of global emergency, we think about creating and developing structures that respond to these changes and to the needs of teacher training and lifelong education, which highlight the multifaceted, multidimensional, multidisciplinary and multicultural, as well as the articulation of knowledge that is required of current teachers/trainers, integrated in this digital network society. In effect, the change in paradigm and educational philosophy, towards digital education in a network, requires an active policy of teacher training, of digital appropriation, in order to facilitate the creation and development of methodologies and pedagogical practices, more coherent with this historical and social time and that consider the specificities and potentialities of new media, in order to provide an increase in terms of quality, through training/qualification programs with connective digital technologies, in which each person can become a co-producer, contributing to the emergence of new educational ecol-

ogies. As digital education in a network is a process characterized by connectivity, speed, fluidity, appropriation of open resources and social media, it is necessary to trigger educational processes aimed at improving and developing the professional quality of teachers who, clearly, at this moment, were taken by surprise. We need to have awareness, which means feeling and responding to the world with knowledge. It is within the framework of these needs at the level of OnLIFE Teaching, that we can contribute, creating training and capacity-building programs for all educational agents aimed at developing training and digital education projects that are not reduced to the concept of online, but that open up Paths to online digital education.

## **COMPARING THE PERSPECTIVES OF TEACHERS AND STUDENTS: INSIGHTS AND IMPLICATIONS**

The pandemic, and its legacy, may accelerate the speed or direction of change in educational assessment in ways that are not easy to predict. The discussion of equity above brings us back to our opening considerations about the educational consequences of the pandemic. One of the impacts that many are very alert to is the likely widening of the attainment gap between those who are and who are not economically disadvantaged within a country – increasing inequity. In tackling these global problems, high-quality assessment will have an important role to play in providing robust data to shape, and challenge, the educational policy agendas within and across countries. In the months and years to come, the themes so cogently explored through the papers in this special issue – teacher agency, assessment literacy, formative assessment, life skills measurement and social justice – will continue to have relevance and resonance, as assessment researchers collaborate to support the educational opportunities of learners throughout the world (Twist, 2021).

Reflective teaching has long been regarded as playing an important, and potentially empowering, role in teachers' professional learning (Chen, 2023). The resultant four themes and eight categories related to aspects including pedagogical strategies, home-school communication, classroom management, and teachers' technological literacy. Within these, approaches to blending online and offline coursework, valuing sociocultural concerns in classroom interaction, and developing adaptive mindsets were among areas identified as relevant to teachers' professional learning beyond the emergency remote teaching situation.

The findings highlight the multiple ways in which professional learning took place through reflective teaching in the remote teaching environment. They draw attention to the importance of situating some professional learning in everyday practice. Understandings gained during remote teaching have broader implications

for educators' professional learning and growth in pre-tertiary education (Moreira & Schlemmer, 2020).

As we have already stated, digital, audiovisual and multimedia technologies have revolutionized our lives. Escaping this reality and ignoring the fascination that our students feel for digital and virtual environments is an attitude to avoid, which is why it is essential to find strategies to put technologies at the service of education, thus creating opportunities for the pedagogical process to become more attractive and promoting the development of the skills listed, necessary to face emerging challenges, such as critical thinking, initiative and entrepreneurship, autonomy, or communication and collaboration. It also seems important to highlight that technologies have enormous potential to improve the pedagogical process, and should assert themselves, inserted in digital learning ecosystems, as a means to help students think, solve problems, create and collaborate. with others (Twist, 2021).

It is, therefore, in this context of change, transformation, openness to new perspectives and learning scenarios that we must promote the development of communities of practice, built not only in physical territories, but also in contexts of digital coexistence, metaverses, hybrids and nomadic, because, in reality, the challenge we face is enormous, but at the same time attractive, because what is at stake is, above all, a paradigm shift towards digitally innovative and networked institutions. And digital is, in part, responsible for this change, and it is not a utopia to consider digital technologies as an opportunity for innovation, integration, inclusion, flexibility or openness. Finally, the answers to the challenge are not in learning digital, but in ensuring that our students evolve from mere consumers to enlightened and active producers, preparing them for adequate cultural belonging (Moreira & Schlemmer, 2020).

## **METHOD**

This study employed a mixed-methods approach based on a hypothetical-deductive method. Data was collected at a single point in time using a questionnaire applied to a convenience sample with the objective to explore the dynamics of the online teaching-learning process management: challenges, strategies and opportunities, to the Portuguese university and polytechnic education (Teachers and Students), during the Covid-19 pandemic period, between the months of September 2020 and December 2020. There was statistical treatment of the data collected in the sample for the study and respective analyzes of statistical tests applied. This sampling method was chosen due to the ease of access for the participants and their availability to answer the questionnaires (Mweshi & Sakyi, 2020).

## Sample

The study involved 1955 participants, categorized into two groups: students and teachers, both from higher education institutions. It's important to mention that the subject areas were classified based on the most recent version of the Frascati Manual (OECD, 2015). Table 1 displays the sociodemographic profiles of both groups.

*Table 1. Sociodemographic characterization of the participants*

Sociodemographic variables	Students (n = 1731)	Teachers (n = 224)
<b>Sex</b>		
Male	725 (41.9%)	154 (68.8%)
Female	1006 (58.10%)	70 (31.3%)
<b>Age group</b>		
Less than or equal to 31 years	1283 (74.1%)	-
Between 32 and 41 years	448 (25.9%)	43 (23.7%)
Between 42 and 51 years	-	83 (37.1%)
Greater than or equal to 52 years	-	88 (39.3%)
<b>Degree studied/taught</b>		
Bachelor's degree	1399 (80.8%)	32 (14.3%)
Master's degree	332 (19.2%)	41 (18.3%)
Both degrees	Not applicable	151 (67.4%)
<b>Area of your course</b>		
Natural sciences	119 (6.9%)	
Engineering and technology	279 (16.1%)	
Medical and health sciences	285 (16.5%)	
Agricultural and veterinary sciences	141 (8.1%)	
Social sciences	784 (44.1%)	
Humanities and arts	143 (8.3%)	

## Measure

Data was collected through five questions developed specifically for this purpose. The initial three open-ended queries concentrated on the primary challenges, as well as the strengths and weaknesses of online teaching. Subsequently, we sought to understand the participants' views on their experiences with this teaching method. Responses were collected using a five-point Likert scale, with “very bad” (1) to “very good” (5). Lastly, a dichotomous scale determined participants' preference between face-to-face and online teaching.

## **Procedures**

The questions were entered into the Google Forms platform, and the link was shared with the researchers' professional contacts. At the beginning of the questionnaire, the objectives of the research were explained, and assurances were given that the guidelines of the General Data Protection Regulation [GDPR; Regulation (EU) No. 679/2016 of April 26] regarding anonymity and confidentiality would be respected. Once the data had been collected, statistical processing was carried out using MAXqda and SPSS (Statistical Package for Social Sciences, version 29).

## **RESULTS**

The results are presented according to the methodology used to process the data. The data from the qualitative study is presented first, followed by the data from the quantitative analysis.

### **Qualitative Analysis**

The content analysis of the first open question allowed us to find out the participants' opinions on the challenges they face when teaching online. The results revealed that the majority of students consider the main difficulty to be the interaction between teachers and students. On the other hand, teachers mentioned that the use of synchronous communication is the most difficult aspect to manage in this teaching modality. They also consider interaction between teachers and students to be the least relevant issue. These findings suggest that the opinions of students and teachers regarding the challenges faced during online teaching tend in opposite directions (Figure 2).

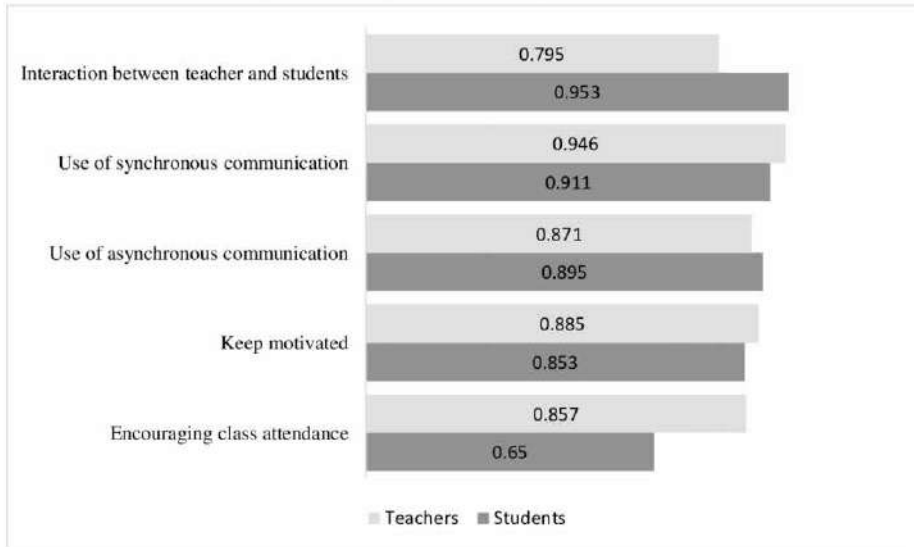


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Figure 1. Opinion on the challenges faced during online teaching: Students vs. teachers

**Figure 1**

*Opinion on the challenges faced during online teaching: students versus teachers*

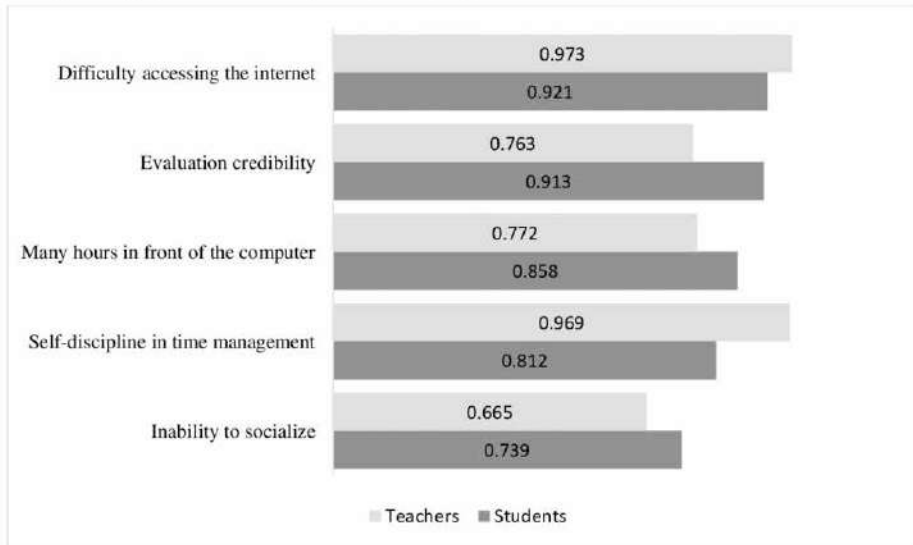


We also sought to find out the participants' perceptions of the weaknesses of online teaching. In this category, the response from students and teachers was unanimous, as the difficulty of accessing the internet was the most mentioned category. On the other hand, it was found that the inability to socialize was the topic least valued by both groups (Figure 2).

*Figure 2. Perception of the weaknesses of online teaching: Students vs. teachers*

**Figure 2**

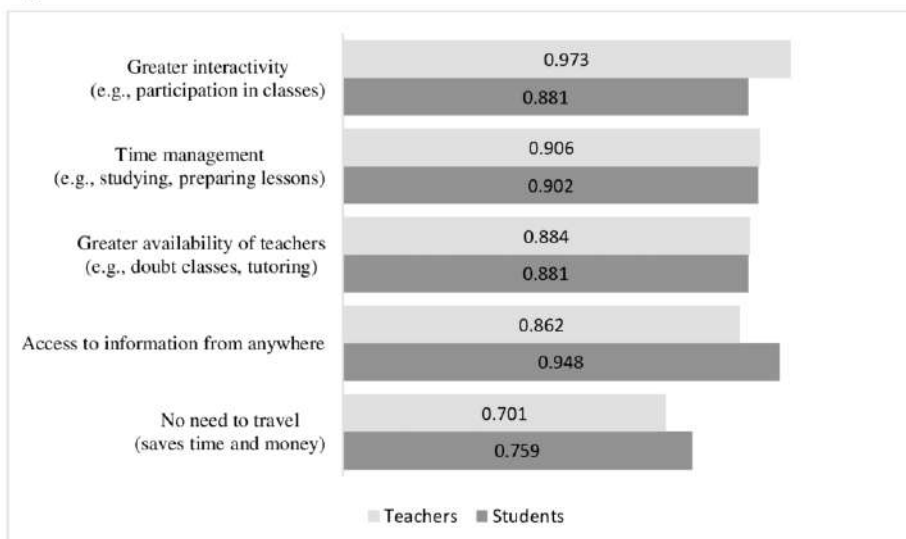
*Perception of the weaknesses of online teaching: students versus teachers*



Finally, the participants were asked about the strengths of online teaching, and once again, the answers converged because both students and teachers said that the increased interactivity during classes, which translates into greater participation, is the added value of this type of teaching. The least valued aspect is the time and money saved by not having to travel (Figure 3).

*Figure 3. Perception of the strengths of online teaching: Students vs. teachers*

**Figure 3**



*Perception of the strengths of online teaching: students versus teachers*

## Quantitative Analysis

Based on the findings from the qualitative analysis, our goal was to identify the factors that significantly influenced participants' experiences with online learning [dependent variable (DV)]. We aimed to understand the participants' perspectives on this experience and discern any significant differences. It's important to note that responses were measured on a five-point scale, ranging from a very bad experience (1) to very good experience (5). Statistical analysis indicated that students had a more positive perception of online learning compared to teachers (Table 2).

*Table 2. Comparative perspectives on online teaching: students vs. teachers*

	Students	Teachers
Very bad experience	2.4%	4.5%
Bad experience	18.6%	16.1%

continued on following page

*Table 2. Continued*

	Students	Teachers
Reasonable experience	21.3%	37.9%
Good experience	25.5%	30.8%
Very good experience	32.2%	10.7%

The data indicated that students scored higher on average ( $M = 3.66$ ,  $SD = 1.17$ ) compared to teachers ( $M = 3.27$ ,  $SD = 1.00$ ). This difference was found to be statistically significant [ $t_{(1953)} = 4.759$ ,  $p < 0.001$ ]. Consequently, the impact of independent variables (IVs) on the dependent variable (DV) was examined individually. It's important to note that the IVs were recoded as dummy variables, where 0 represents the absence of an attribute and 1 indicates its presence. A multiple linear regression was performed using the Enter method. The results confirmed that the model was both linear and statistically significant for both students [ $F_{(15,1715)} = 5.784$ ,  $p < 0.001$ ] and teachers:  $F_{(15, 208)} = 1.842$ ,  $p < 0.001$ . To enhance clarity and avoid cluttering the tables, only the statistically significant variables are included (Tables 3 and 4).

The regression analysis revealed that greater availability of teachers (*e.g.*, doubt classes, tutoring) was the primary factor influencing students' experiences during online teaching ( $\beta = 0.126$ ,  $t = 4.888$ ,  $p < 0.001$ ). Additionally, difficulty in accessing the internet was found to negatively affect these experiences ( $\beta = -0.088$ ,  $t = -3.327$ ,  $p < 0.001$ ).

*Table 3. Factors influencing students' experiences during online teaching*

Explanatory variables	Online teaching experience
Use of synchronous communication	0.116**
Evaluation credibility	0.067*
Difficulty accessing the internet	-0.088**
Greater availability of teachers ( <i>e.g.</i> , doubt classes, tutoring)	0.126**
Adjusted R <sup>2</sup>	0.040
F <sub>(15,1715)</sub>	5.784**

Note: \* $p < 0.05$ ; \*\* $p < 0.001$

As mentioned earlier, 58.5% of the teachers felt that their online teaching experience ranged from very poor to merely fair. In light of these findings, we sought to understand the underlying reasons for this sentiment. Two primary factors emerged: the credibility of evaluations ( $\beta = -0.218$ ,  $t = -2.265$ ,  $p < 0.05$ ) and the ongoing pressure from students for clarifications and tutorial sessions ( $\beta = -0.185$ ,  $t = -2.505$ ,  $p < 0.05$ ). Both factors significantly contributed to their dissatisfaction.

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Table 4. Factors influencing teachers' experiences during online teaching

Explanatory variables	Online teaching experience
Use of synchronous communication	- 0.162*
Evaluation credibility	- 0.218*
Difficulty accessing the internet	- 0.185*
Greater availability of teachers (e.g., doubt classes, tutoring)	- 0.161*
Adjusted R <sup>2</sup>	0.040
F <sub>(15,1715)</sub>	5.784**

Note: \*p < 0.05; \*\*p < 0.001

The results indicate that despite the challenges and weaknesses highlighted by the participants, there was a clear difference in teaching method preferences. Students showed a preference for distance learning, whereas teachers favored face-to-face classes. This distinction was statistically significant as illustrated in Table 5 [ $t_{(1953)} = - 3.620, p < 0.001$ ].

Table 5. Preference for teaching method: students versus teachers

Type of teaching	Students	Teachers
Face-to-face teaching	43.5%	56.3%
Online teaching	56.5%	43.8%

The results show that despite the challenges and weaknesses mentioned by the participants, their perception of online teaching is positive, and several strengths have been identified. It was also found that the opinions of students and teachers do not always converge in the same direction, which suggests that the experience of distance learning was not experienced in the same way by both groups. These results are reflected in the preference for the teaching method, as there was a strong positive correlation ( $r = 0.706, p < 0.001$ ) between the experience and the tendency to prefer online teaching.

## DISCUSSION

This study intends explore the dynamics of the online teaching process. To this end was employed a mixed-methods approach based on hypothetical-deductive method, data was collected at singles point time using a questionnaire applied a convenience sample.

The study involved 1955 participants categorized into two groups: students and teachers. With regard to a socio-demographic characterization of participants, the date was collected through five questions developed specially for this purpose. The initial three open-ended queries concentrated on the primary challenges, as well as the strengths and weaknesses of online teaching. Subsequently, we sought to

understand the participants views on their experiences with this teaching method. Regarding to the procedures, the questions were entered into the Google Forms platform, and the link was shared with the researcher's professional contacts. Once the data had been collected, statistical processing was carried out using MAXqda and SPSS © (Statistical Package for Social Sciences, version 29).

The results are presented according to the methodology used to process the data. The data from the qualitative study is present first, followed by the data from quantitative analysis.

## **Quality Analysis**

The results revealed that majority of students consider the main difficulty to be the interaction teachers and students, on other hand, teachers mentioned that the use of synchronous communication is the most difficult aspect of manage in this teaching modality. They also consider interaction between teachers and students to be the least relevant issue. These findings suggest that the opinions of students and teachers regarding the challenges faced during online teaching tend in opposite direction. We also to find out the participants perception of the weaknesses of online teaching. In this category, the response of students and teachers was unanimous, as the difficulty of accessing the internet was the most mentioned category. On the other hand, it was found that the inability to socialize was the topic least valued by both groups.

Finally, the participants were asked about the strengths of online teaching, and once again, the answers converged because both students and teachers said that increased interactivity during classes, which translates into greater participation, is the added value of this type of teaching. The least valued aspect is the time and money saved by not having to travel.

## **Quantitative Analysis**

Base on the finding from qualitative analysis, our goal was identifying the factors that significantly influence participants' experiences with online learning. Considering comparative perspectives on online teaching: students versus teachers, the data indicated that students score higher on average, and the regression analysis revealed that greater availability of teachers was the primary factor influencing students' experiences during online teaching, results aligned to

Adnan & Anwar (2020), and Moreira & Schlemmer (2020). Additionally, difficult in accessing the internet was found to negatively affect these experiences.

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As mentioned early 58,5% (45% very bad experience, 16.1% bad experience, and 37,9% reasonable experience), the teachers felt that their online teaching experience ranged from very poor to merely fair. In light of these findings, we sought to understand the underlying reasons for this sentiment two primary factors emerged: the credibility of evaluation and the ongoing pressure from students for clarifications and tutorial sessions. Both factors significantly contributed to their dissatisfaction. The results of factors influencing teacher's experiences during online teaching, indicate that despite the challenges and weaknesses highlighted by the participants, and the results are aligned with Adnan & Anwar (2020). There were clear differences in teaching method preferences. Students showed a preference for distance learning, whereas teachers favored face-to-face classes (Chen, 2023; Yu *et al.*, 2022).

## **CONCLUSION**

The results show that despite the challenges and weaknesses by the participants, their participation of online teaching is positive, and several strengths have been identified. It was also found that the opinions of students and teachers do not always converge in same direction, which suggest the experience of distance learning was not experienced in the same way by both groups. These results are reflected in the preference for the teaching method, as there was a strong positive correlation ( $r=0,706$ ,  $p<0,001$ ) between the experience and the tendency to prefer online teaching (Yu *et al.*, 2022). Globally, the results are aligned with the review of literature. It's important to highlight that technologies have enormous potential to improve the pedagogical process, and should assert themselves, inserted in digital learning ecosystems, as a means to help students think, solve problems, create and collaborate. with others (Twist, 2021).

Also, in this context of change, transformation, openness to new perspectives and learning scenarios that we must promote the development of communities of practice (Yu *et al.*, 2022), built not only in physical territories, but also in contexts of digital coexistence, metaverses, hybrids and nomadic, because, in reality, the challenge we face is enormous, but at the same time attractive, because what is at stake is, above all, a paradigm shift towards digitally innovative and networked institutions (Moreira & Schlemmer, 2020). We are living in a digital society and digital is, in part, responsible for this change, and it is not a utopia to consider digital technologies as an opportunity for innovation, integration, inclusion, flexibility or openness, creating quality education and learning process strategies (Chen, 2023). We recognized as not in learning digital, but in ensuring that our students evolve from mere consumers to enlightened and active producers, preparing them for adequate

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cultural belonging (Moreira & Schlemmer, 2020) and it's important to developing education and learning strategic policies with quality.



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