USE OF DIGITAL PLATFORMS AND TECHNOLOGIES BY TEACHERS AND STUDENTS

USO DE PLATAFORMAS E TECNOLOGIAS DIGITAIS POR PROFESSORES E ALUNOS

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Abstract:

The study analyzed the frequency and purpose of use of nine digital platforms and technologies (DPTs) by teachers and students, before and during the quarantine period due to COVID-19 and investigated its influence on these characteristics of use and the main problems and difficulties encountered by teachers and students during the pandemic for their school activities. Data was collected by applying questionnaires, answered by 105 students and 43 teachers from five schools in Portugal. The results revealed that teachers used DPTs significantly more frequently than students. During the quarantine, teachers and students reported more frequent use of DPTs, but with the same purposes as in the pre-pandemic context. Teachers claimed to use them more frequently for communication with students and for monitoring their work and school assignments. The students used them more often for submitting assignments. The main difficulties encountered by teachers were insufficient and obsolescent computer equipment and internet access. Students identified internet access as the biggest problem. During quarantine, teachers reported difficulties more related to social, pedagogical, and technical aspects, while students presented problems related to personal and technical factors. The study found that teachers use DPTs more frequently than students in their school routines, but also encounter more difficulties in using them.

Keywords: teachers; students; digital platforms; digital technologies.

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Resumo:

O estudo analisou a frequência e a finalidade do uso de nove plataformas e tecnologias digitais (PTD) por professores e alunos, antes e durante o período de quarentena devido à COVID-19, e investigou sua influência sobre essas características de uso e os principais problemas e dificuldades encontrados por professores e alunos durante a pandemia para suas atividades escolares. Os dados foram recolhidos mediante a aplicação de questionários, respondidos por 105 alunos e 43 professores de cinco escolas de Portugal continental. Os resultados revelaram que os professores utilizavam as PTD com uma frequência significativamente maior do que os alunos. Durante a quarentena, professores e alunos relataram o uso mais frequente das PTD, porém com os mesmos objetivos do contexto pré-pandêmico. Os professores alegaram utilizá-las com maior frequência para a comunicação com os alunos e para a monitorização dos seus trabalhos escolares. Os alunos utilizaram-nas mais para o envio e para apresentação de trabalhos e tarefas escolares. As principais dificuldades encontradas pelos professores foram a insuficiência e a obsolescência dos equipamentos informáticos e o acesso à internet. Os alunos identificaram o acesso à internet como o maior problema. Durante a quarentena, os professores identificaram dificuldades mais relacionadas com aspetos sociais, pedagógicos e técnicos, enquanto os estudantes apresentaram problemas relacionados com fatores pessoais e técnicos. O estudo constatou que os professores utilizam as PTD com maior frequência do que os alunos nas suas atividades escolares, porém também encontram maiores dificuldades na sua utilização.

Palavras-chave: professores; estudantes; plataformas digitais; tecnologias digitais.

INTRODUCTION

The digitization process has brought significant changes in several areas of society. The frequent use of multifunctional mobile phones for communication, shopping, work, and entertainment, for example, leaves no doubt about the importance of digital technologies in the information and communication practices of modern societies (ALMEIDA, 2018; PAPI, 2019). Consequently, the introduction of digital technologies in educational practices presents an obvious way for schools to respond to new social challenges (CALVET; CAVERO; ALEANDRI, 2019), in part because "digital technologies have been one of the focuses of a new generation of education policies in the European Union, being one of the priority axes of Agenda 2020" (PINTO; LEITE, 2020, p. 2).

According to Agenda 2020, the European Union wanted Europe to show wise growth by 2020, highlighting progress and innovation as key factors for future development (COMISSÃO EUROPEIA, 2010a). However, for this to be possible it was necessary, among other dimensions, to improve the quality of education, strengthen the development of research, promote innovation transfer of knowledge, and take full advantage of information and communication technologies (COMISSÃO EUROPEIA, 2010a).

Recognizing the importance of digitization in the school context, UNESCO, in 2019, developed the ICT skills standards for teachers, which presents 18 skills covering six aspects of teachers' professional practice — understanding the role of ICT in educational policies, curriculum and assessment, pedagogy, application of digital skills, organization and administration, and teacher's professional learning — with the aim of training teachers about the use of ICT in education (UNESCO, 2019). According to UNESCO (2019), in providing education with the

support of technologies, this document incorporates principles of non-discrimination, open and equitable access to information and gender equality, besides responding to technological and pedagogical developments in the field of ICT and education.

Over the past 20 years, the Nations Member of the European Union have made several commitments aimed at promoting the digitalization of educational institutions and ensuring that all people are able to communicate and interact socially through digital technologies. Examples of these are: the restructured Lisbon Strategy (COMISSÃO EUROPEIA, 2005); the Europe 2020 Strategy (COMISSÃO EUROPEIA, 2010b); the renewed Digital Education Action Plan 2021-2027 (COMISSÃO EUROPEIA, 2020); and the Digitally Ready Europe initiative (COMISSÃO EUROPEIA, 2021).

Salavati (2016, p. 7) points out that a variety of definitions can be used to describe and highlight the concepts of "digital technology, information technology (IT), information and communication technology (ICT) and educational technology", which are used interchangeably, as there is no clear discrimination between them. The author also claims that, although information technology and educational technology are frequently used, the most common concept in the literature is ICT (SALAVATI, 2016), which includes digital platforms (VALENTE, 2019). According to the Valente (2019, p. 170),

> […] digital platforms are technological systems that function as active mediators of interactions, communications and transactions between individuals and organizations operating on a connected digital technological base, especially in the scope of the Internet, providing services based on these connections, strongly backed by data collection and processing and marked by network effects.

In the context of education, Calvet, Cavero and Aleandri (2019) argue that digital platforms facilitate economic, academic and classroom management, allow teachers to give tutorials online, provide students with new learning, interaction and work environments and constitute a channel of communication with families. Fernandes and Figueiredo (2020) reinforce this idea when they state that digital platforms make it possible to establish closer relationships between the school and the educational community, which contribute to promoting the involvement of parents in the school's life and its students. In this sense, digital platforms manifest themselves as "a new tool in the management of the school and at the same time as a channel of information and communication" (CALVET; CAVERO; ALEANDRI, 2019, p. 4).

Rodrigues, Brito and Gomes (2011, p. 141) endorse this idea, adding that digital educational platforms have "promoted a significant development, reducing distances, complementing face-to-face classes, enabling access to educational content in a virtual way and to new projects based on distance learning models and blended learning". As stated by the authors, the platforms present many collaborative tools capable of providing content, developing new forms of collaboration and interaction between students and teachers, evaluating the knowledge acquired, managing teaching processes and using Web 2.0 resources, such as forums and chats (RODRIGUES; BRITO; GOMES, 2011).

Despite the intensification of their usage, digital platforms are not new and have been used according to the needs of the entities that apply them (LOPES; GOMES, 2020). According to the authors, digital platforms can be used to share content and activities, monitor students' progress

and assess their work and tasks and create spaces for interactive communication and debates and discussion groups around topics of interest (LOPES; GOMES, 2020).

Currently, in the educational scenario, there are different sorts of digital platforms, which provide different tools and resources. Lopes and Gomes (2020) classify digital educational platforms into five types, according to activity, namely: communication, collaboration, learning, planning and management.

Digital communication platforms are designed to encourage and supervise activities, communicate synchronously and asynchronously, ensure pedagogical monitoring, and provide information about current classes. The main tools of this type of digital platform are messages, chats, forums, classes, and surveys (LOPES; GOMES, 2020). Digital collaboration platforms involve group activities and allow collective production and sharing of resources. The most frequent examples are blogs, file sharing and wiki tools (LOPES; GOMES, 2020). Digital learning platforms are designed to create multimedia pedagogical resources, which include interactive classes, content pages, quizzes, links, video and audio files, tests, glossaries, and indexes (LOPES; GOMES, 2020). Digital planning platforms are used to schedule and manage timetables, whose tools include calendars and shared agendas (LOPES; GOMES, 2020). Finally, digital management platforms involve the registration process, constitution of groups, personalization of the classroom and monitoring of online activities. For these platforms, the main tools are online tests, links, and access codes (LOPES; GOMES, 2020).

The massive presence of several school platforms has transformed the relationships between different subjects in the school environment, enabling wide access to information and digital culture (SANTOS; SCARABOTTO; MATOS, 2011). The terms "digital native" and "digital immigrants" have been influential in defining the actors in this new scenario of transformed relationships. The terms were introduced by Prensky (2001) in the article entitled "Digital Natives, Digital Immigrants". The article has been heavily scrutinized and contested but it is "likely the most frequently cited article on learners and technology ever (having over 26,000 citations in Google Scholar as of January 2020)" (SMITH; KAHLKE; JUDD, 2020, p. 1).

According to Prensky (2001), digital natives are individuals who were born and raised in a context full of digital technologies, while digital immigrants represent individuals who had late access to these technologies and who need to undergo an adaptation process. Prensky's proposal is that there are different generational groups living in the same reality (COELHO; COSTA; MATTAR NETO, 2018). In the school context, students would be part of the group of digital natives while the group of teachers would be composed, mostly, by digital immigrants (PRENSKY, 2001).

However, the concept of "digital natives" is based on the proposal that younger students already have the knowledge and mastery of the skills needed to use digital technologies, whereas digital literacy advocates emphasize the importance of learning to use technologies effectively (SMITH; KAHLKE; JUDD, 2020). Kirschner and De Bruyckere (2017, p. 40) corroborate this idea, claiming that research shows that students of the current generation, although have experienced a connected digital world, "are not capable of dealing with modern technologies in the way which is often ascribed to them (i.e., that they can navigate that world for effective and efficient learning and knowledge construction)". In addition, Nicolau, Pessoa and Costa (2018, p.

559) argue that "many of the main digital technologies that we use today were created by individuals who, according to Prensky's ideas, should be classified as digital immigrants".

It is worth emphasizing that Prensky's original article is not a scientific research article and does not present empirical data to support his arguments (EVANS; ROBERTSON, 2020; KIRSCHNER; DE BRUYCKERE, 2017). According to Mertala and Salomaa (2020, p. 187), "research suggests that the digital native belief is often based on anecdotal observations of children's digital media use (Mertala, 2019a) and/or is influenced by public discussions about children and digital media (SALOMAA; MERTALA, 2019)".

However, the lack of empirical support for the concept of digital natives does not imply that the current educational scenario has not been affected by the growth in the use of digital technology (BULLEN; MORGAN, 2011). Furthermore, Coelho, Costa and Neto (2018) point out that, despite the criticisms of Prensky (2001, p. 1087) discourse, this non-compliance was important to "establish a reflection on behavioral and cultural differences between generations, even in the first moment of investigation".

Two decades have passed since Prensky's article was published and the debate has not yet been resolved (EVANS; ROBERTSON, 2020). Although students and teachers do not fit the stereotypes of digital natives and digital immigrants, there is no doubt that digital technologies are part of their social and educational lives (COELHO; COSTA; NETO, 2018) and that new generations tend to use digital technologies more than previous generations (BULLEN; MORGAN, 2011). Nonetheless, Bullen and Morgan (2011) point out that the use of digital technologies by individuals of older generations is growing rapidly. In a study by Waycott et al. (2010), the authors reported that students and teachers use many of the same digital technologies in their daily lives and that the way they perceive and use them "might be better understood in terms of their different roles as students or staff, rather than age-related differences" (p. 1210).

Evans and Robertson (2020) also argue that educational qualifications can be a bigger influence than age for the distinction between digital natives and digital immigrants. According to the authors,

> […] the gap between students and educators might not exist in the way it has been portrayed and, if it does, so-called digital immigrants have the ability to close it and become, in essence, the equivalent of digital natives or even their betters, growing to possess a greater degree of digital proficiency than the students whom they teach. (EVANS; ROBERTSON, p. 271)

Regardless of generation, both students and teachers benefit from the use of pedagogical tools and there is a need to align communication between digital natives and digital immigrants. According to Coelho, Costa and Neto (2018), although some individuals were born inserted in digital culture and others have made a journey to adapt to it, both share knowledge of the digital universe. Fantin (2016) points out that contrary to the idea of digital natives and immigrants, which concerns the distance between young people and adults regarding the use of digital technology, there are studies that demonstrate the approximation of these two groups.

Digital technology has certainly transformed relationships in the school learning environment. Through digital platforms, teachers and students come into contact with tools "capable of supporting informal conversation, reflexive dialogue and collaborative content

generation, enabling access to a wide raft of ideas and representations" (MCLOUGHLIN; LEE, 2010, p. 28). Moreover, the appropriate use of these tools is able to promote the development of autonomy and student participation by creating learning environments through information sharing (ALJENAIBI, 2015).

According to Júnior et al. (2017, p. 14), "from the education perspective, technology adds values that create new didactic forms for the transmission of information, enabling teaching closer to reality, changing the role of the educator in relation to the student". Salavati (2016) supports this proposition, stating that the roles and relationships of teachers and students are changing in the classroom due to the wide access and use of digital technologies outside and inside the school settings.

In this sense, by taking advantage of digital technologies, teachers cease to be mere transmitters of knowledge and become facilitators of learning, promoting student-centered learning (JÚNIOR et al., 2017; SUN; GAO, 2019). According to Sun and Gao (2019), in addition to facilitating student-centered learning, teachers take on three other new roles: students, which allows them to improve their technological proficiency; collaborators, through participation in formal and informal discussions; and researchers, who, both individually and in groups, can explore their teaching practices and improve their teaching skills.

Within this perspective, this study aims to compare the frequency and the purpose of use of nine digital platforms and technologies (DPTs) by teachers and students from five schools in Portugal, before the quarantine period due to COVID-19, as well as to identify its influence on these characteristics of use and the main problems and difficulties encountered by teachers and students during the pandemic.

The reason for this study is justified by the fact that Portugal, as a Nation Member of the European Union, has committed, over the last 20 years, to several programs aimed at promoting the digitalization of educational institutions and ensuring that all people are able to communicate and interact socially through digital technologies. One of them was the Action Plan for Digital Transition (PORTUGAL, 2020), that reinforces the importance of digital qualification of the population and calls for measures for the integration of digital technologies in the different curricular areas of primary and secondary education. This integration, which aims to continuously improve the quality of learning, in addition to innovation and the development of the educational system, was accelerated due to the situations arising from the pandemic caused by COVID-19 (PORTUGAL, 2020), which led to an unprecedented change in the use of digital technologies.

In this regard, we formulated the following research questions: what are the differences between teachers and students from schools in Portugal regarding the frequency and purpose of DPTs use before and during the quarantine period due to covid-19? What was the influence of the pandemic situation on these usage characteristics? What were the main problems and difficulties encountered by professors and students regarding the use of DPTs during the pandemic?

METHODOLOGY

This paper is part of a study developed within the scope of an ongoing research project, financed by Foundation for Science and Technology (FCT), aiming to identify and characterize how and why DPTs are used in schools. For data collection, two questionnaire surveys were carried

out with teachers and students. The questionnaires followed a common matrix, taking into account the different sociodemographic specificities and the use of DPTs by these educational agents. The questions were grouped into three blocks: 1) Sociodemographic data; 2) Use of DTPs; 3) Effects of the use of DTPs (advantages and difficulties).

The teachers' questionnaire contained 17 questions and the students' questionnaire contained 14, 13 of which coincided. Four types of questions were used: multiple choice, open response, dichotomous scales (yes and no), and 5-point Likert scales type (between 1 = strongly disagree and 5 = strongly agree).

The questions were carefully prepared, respecting technical principles (FODDY, 2002), and information about the anonymity and confidentiality of data was given to respondents before they completed the questionnaire.

The questionnaire's validity was assessed by experts (a "panel of judges") and by pre-testing with a sample selected "for convenience" (GHIGLIONE; MATALON, 1992; HILL; HILL, 2005), consisting of a group of schools chosen due to an existing relationship between the school directors and the project researchers, located in five different territories (North, Center, Lisbon Metropolitan Area, Alentejo and Algarve). The two questionnaires were pre-tested online using the Google Forms platform in June and July 2020, and respondents were grouped according to the following criteria: Students' Questionnaire — answered by students from three classes, one from each final year of the three Ensino Básico (compulsory education) cycles (years 6, 9 and 12); and Teachers' Questionnaire — answered by all teachers from the Pedagogical Council, to ensure the representation of teaching staff.

The questionnaires were answered by 105 students from public schools in Portugal, of which 58.1% (N = 61) are female and 41.9% (N = 44) male, and by 43 teachers, of which 69.8% (N = 30) are female and 30.2% (N = 13) male. The average age of the students is 15.45 (SD = 2.16), with 13% (N = 14) in 6th grade, 46% (N = 48) in 9th grade, and 41% (N = 43) in 12th grade. For the teachers, the average age is 54.81 (SD = 5.04).

DATA ANALYTICAL PROCEDURES

The statistical analysis included frequency analysis, the Mann-Whitney U test, the chi-square test, and the Pearson's correlation coefficient, using SPSS software, v. 27. Frequency analyses were performed in order to: (a) identify the frequency of use of DPTs by teachers and students; (b) identify the percentage of teachers and students who answered yes to the question about the use of each DPT for unlisted purposes during quarantine; (c) identify the percentage of teachers and students who answered yes to the question about their use of DPTs more frequently than usual during the quarantine period; and (d) identify the other purposes of using DPTs during quarantine and the respective frequency of use by teachers and students.

The Mann-Whitney U test was used to compare teachers' and students' mean frequency of use of the nine DPTs, taking into account that not all variables followed a normal distribution pattern. According to Field (2009), the Mann-Whitney U test is a non-parametric test, "equivalent of the independent t-test" (p. 540), "used to compare two conditions when different participants take part in each condition and the resulting data violate any assumption of the independent t-test" (p. 551).

Pearson's chi-square test was used to analyze teachers' and students' frequency of use of the nine DPTs during the quarantine period. Field (2009, p. 688) states that "this is an extremely elegant statistic based on the simple idea of comparing the frequencies you observe in certain categories to the frequencies you might expect to get in those categories by chance".

Pearson's correlation coefficient analysis was performed to estimate the correlation between the average frequency of general DTPs use and the level of agreement on the difficulties in the use of DTPs by students and teachers.

RESULTS AND DISCUSSION

The results showed that there was no significant difference ($p > .05$) between teachers and students in the average frequency of use of Microsoft Office and the pupil's electronic report (an app for schools, students, and families to share timetables, information and messages, which is provided in all public schools in Portugal) for daily school activities. For the other DPTs, apart from social networks, the average frequency of use by teachers was significantly higher ($p < .05$) than that of students, as shown in Table 1 and Figure 1.

Table 1 - Average difference in the frequency of use of DPTs between students and teachers

DPT	Respondents	N	M	SD	U
Virtual Environments	Students	103	3.64	4	1882.00
	Teachers	42	3.38	3	
Microsoft Office	Students	105	2.58	3	1811.50
	Teachers	43	3.09	3	
Blog	Students	105	1.12	1	1122.50[***]
	Teachers	43	2.14	2	
Pupil's electronic report	Students	104	1.22	1	2079.00
	Teachers	43	1.23	1	
Electronic mail	Students	103	4.35	5	1550.00[**]
	Teachers	43	4.79	5	
Clouds	Students	104	2.48	2	705.00[***]
	Teachers	42	4.07	5	
School Website	Students	104	2.88	3	1304.00[***]
	Teachers	43	3.81	5	
School Platforms	Students	104	3.10	3	1403.00[**]
	Teachers	42	3.93	5	
Social Networks	Students	103	3.78	4	1672.00[*]
	Teachers	43	3.26	3	

Note. N = number of respondents; M = mean; SD = standard deviation; U = Mann-Whitney's U test
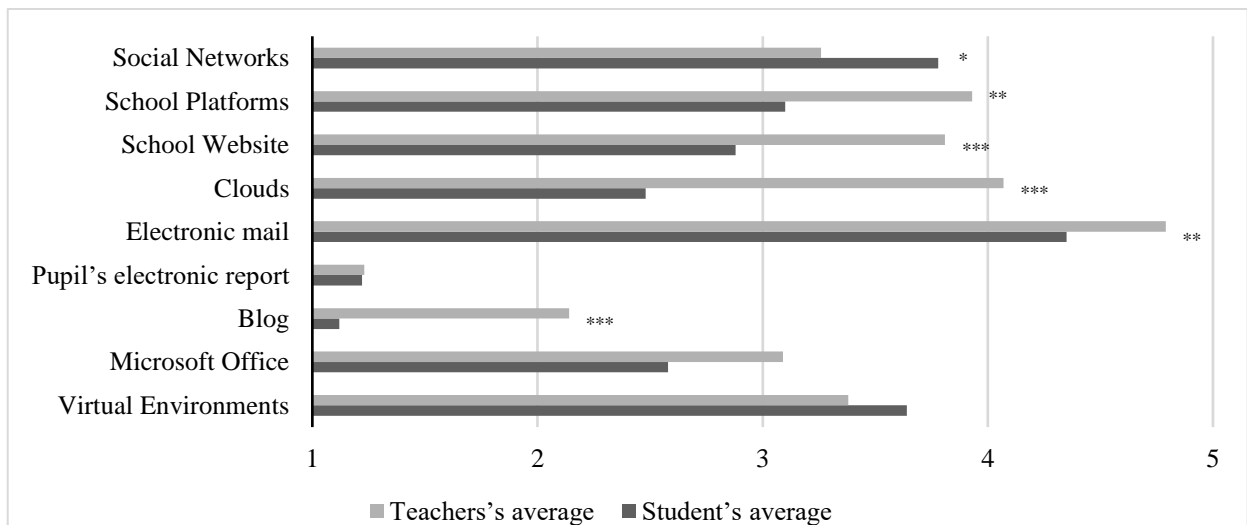[*]$p < .05$
[**]$p < .01$
[***]$p < .001$
Source: Own elaboration

Figure 1 - Average frequency of use of DPTs by students and teachers

Note. 1 = never; 2 = seldom; 3 = sometimes; 4 = frequently; 5 = always
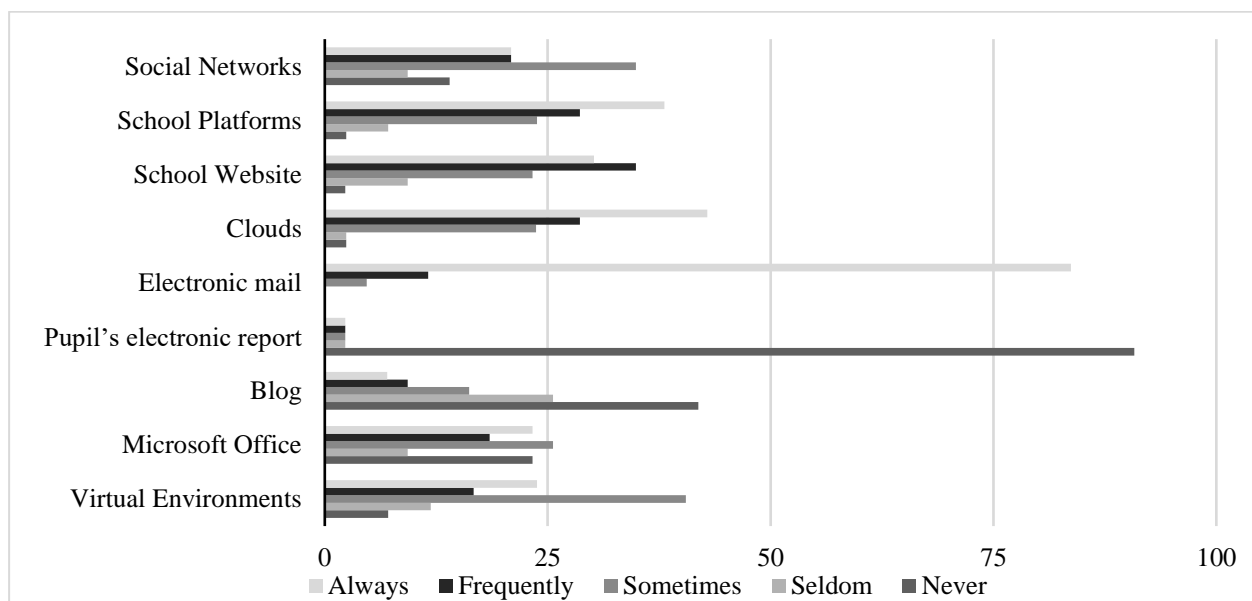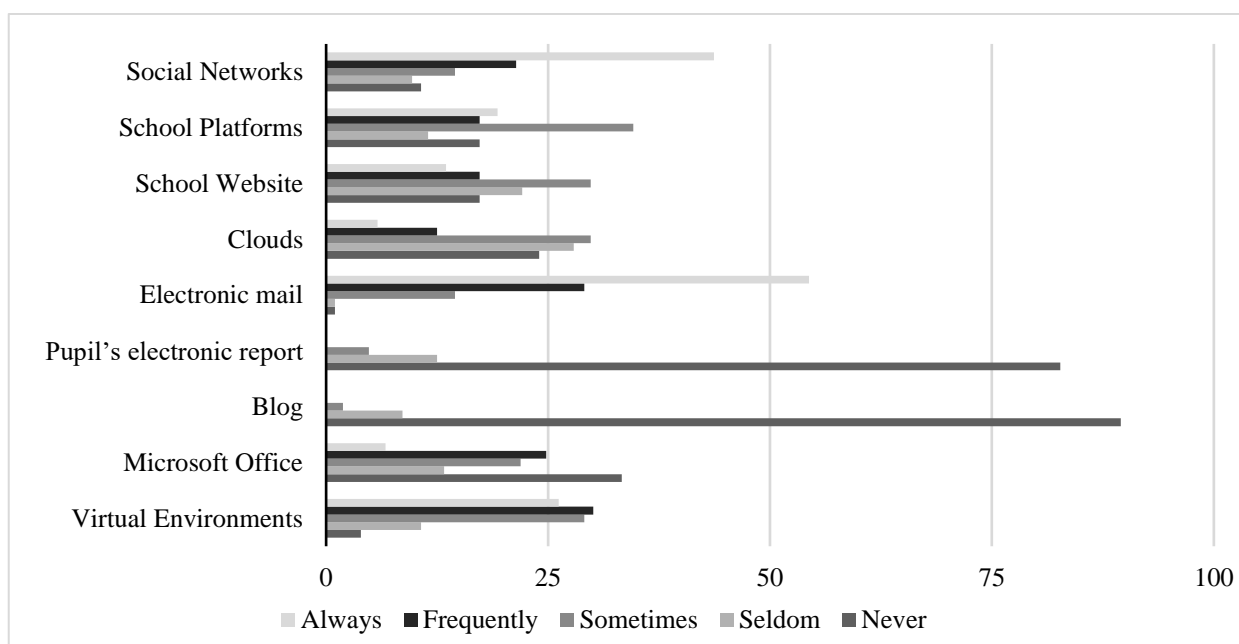* $p < .05$
** $p < .01$
*** $p < .001$
Source: Own elaboration

Figures 2 and 3 show the results, as percentages, of the frequency of use of DPTs by teachers and students, respectively.

Figure 2 - Frequency of use, as percentages, of DPTs by teachers

Source: Own elaboration

Figure 3 - Frequency of use, as percentages, of DPTs by students

The most used DPTs for daily school activities were defined as those with a sum of the percentage of frequency of use in categories 4 (frequently) and 5 (always) greater than 50%, and the results clearly show that teachers make more use of electronic mail (95.3%), school platforms (73.7%), clouds (71.5%) and the school website (65.1%). In the case of students, the most used platforms were electronic mail (83.5%), social networks (65.1%) and virtual environments (56.3%).

It appears that, even when using the same DPT, there is no common pattern of use between teachers and students. The differences in frequency of use can be explained, according to Waycott et al. (2010), by the fact that staff and students play different roles in the school context, even when they are using the same technologies. The results of the Teachers' Questionnaire corroborate those presented by Costa, Ribeiro and Ferreira (2013), which reveal that electronic mail is one of the most used platforms for teaching practice, while the use of social networks is much lower. For students, the results match those reported by Bullen and Morgan (2011), which showed an overlap in the use of electronic mail, social networks, text messages and context-specific educational technologies.

The analysis also indicated that teachers are the most frequent users of DPT in school life. This fact supports the study by Wang et al. (2014), whose results indicated that "teachers use a variety of technologies as often as their students do, even surpass them, whether inside or outside of school" (p. 655). The data also reinforce the conclusions of Bullen and Morgan (2011), who claim that the use of these digital technologies by older generations has been growing rapidly; likewise, the results support those of Cruz and Marinho (2012), which highlight that teachers are daily users of digital technologies at school and in teaching work; and those of Coelho, Costa and Neto (2018), when they state that digital technologies are part of the teacher's social and educational life.

It is interesting to note that social networks were the only category of DPT where student use was significantly higher ($p > .05$) than teachers, with students making much more use than teachers of networks such as Facebook, Instagram, Twitter, and WhatsApp. This result is in line with work by Costa, Ribeiro and Ferreira (2013), which revealed that only 30% of teachers used Facebook and 20% of teachers used WhatsApp for teaching practice, while none of the teachers used Twitter or Instagram for teaching activity. In terms of the use of social networks by students, the results relate to those obtained by Bullen and Morgan (2011), which showed that the use of cell phones was a predominant practice among students, mainly for accessing text messaging platforms and Facebook, which were both used for both social and academic purposes. This corresponds with the data from the present study, which indicates that 65.1% of students always or frequently use social networks for school activities.

Regarding the less used platforms, defined as those with the sum of the percentage of frequency of use in categories 1 (never) and 2 (seldom) greater than 50%, it is notable that most teachers and students do not use or rarely use the pupil's electronic report (93% and 95.2%, respectively) and blogs (67.5% and 98.1%, respectively). Just over half of the students also revealed a low use of clouds (51.9%).

In the case of blogs, the results of the Teachers' Questionnaire are similar to those presented by Cruz and Marinho (2012), in which the authors showed that teachers over 41 years old do not use blogs for personal or pedagogical purposes. In the present study, all teachers were over 41 years old and, although there are respondents in all five categories of frequency of use, most of them (67.5%) declared that they never or seldomly use blogs. A similar result was found by Costa, Ribeiro and Ferreira (2013), which showed that only 10% of the teachers analyzed used blogs.

As blogs are a tool to complement classroom teaching, with the aim of creating a learning community around a topic of interest, which allows the organization of forums and the representation of text, schoolwork, and tasks (CARVALHO; MOURA; SÓNIA CRUZ, 2006), their use should be often stimulated and promoted by teachers. The fact that 67.5% of teachers in our study never or rarely use blogs in their daily school activities is probably reflected in the 98.1% of students who never or rarely use blogs. This low percentage of blog use by students can also be associated with the lack of knowledge about the platform, as demonstrated in the research by Carvalho, Moura and Sónia Cruz (2006), whose results indicated that "80% of 2nd cycle students and 92% of 3rd cycle students did not know this tool" (p. 647-648).

When it comes to the pupil's electronic report, the low frequency of use reported by teachers is surprising. This is because studies by Abreu et al. (2016) revealed that 92.3% of teachers recognize the "importance of finding a means that provides an intensification and greater ease in communication between the school and the guardians" (p. 1068) and that 87.3% of teachers admit that the pupil's electronic report is "a resource that facilitates communication and work, between school and family" (p. 1068). In this sense, a higher frequency of use of this digital platform by teachers was expected. In the case of students, the low frequency of use was to be expected, since the pupil's electronic report is a platform that enhances and facilitates communication and interaction between the family and the school, regarding all the information associated with the students, but which does not necessarily involve direct communication with students.

The results of our research into the frequency of use of DPTs in schools contributes to the critique of the idea of digital natives and digital immigrants, at least in the classroom context, endorsing the results of several research studies (BULLEN; MORGAN, 2011; COELHO; COSTA; MATTAR NETO, 2018; FANTIN; RIVOTELLA, 2012; WANG et al., 2014; WAYCOTT et al., 2010), which show that teachers, usually characterized as digital immigrants, are increasingly adopting digital technologies and platforms in their professional lives, often to a greater extent than students, who have up until now been considered digital natives.

Taking into account the use of DPTs during the quarantine measures due to COVID-19, the analysis of the responses of students and teachers, (Figure 4 and Table 2) revealed that only 15.4% and 4.7%, respectively, used DPTs for purposes beyond those listed in the questionnaires (Table 3). Of the 16 students who claimed to use them for other purposes, six clarified for what purposes: three used them for leisure and games, one for contacting other students, one for attending classes and one for communicating with family members. The two teachers who indicated using DPTs for other purposes during the quarantine period did not specify how they were used.

Figure 4 - Percentage of students and teachers who answered yes to questions about the use of DPTs for unlisted purposes and about using DPTs more frequently than usual.
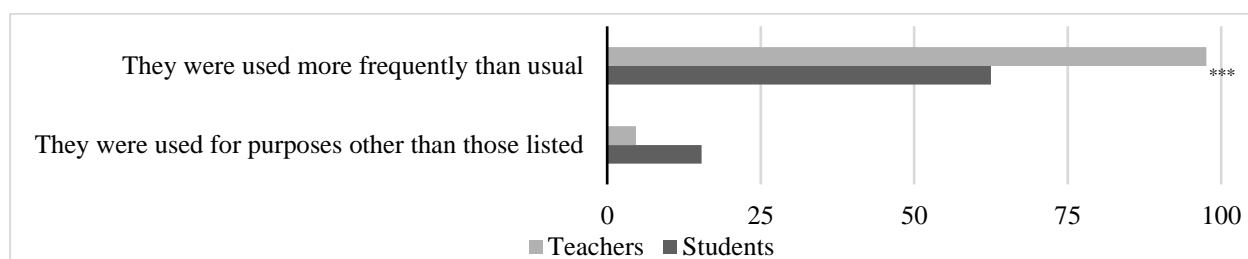
Note. $^{***}p < .001$
Source: Own elaboration.

Table 2 - Average difference in the use of DPT by students and teachers during the quarantine due to COVID-19

DPT	Respondents	N	M	SD	X^2
Use for other purposes	Students	104	1.85	0.363	3.26
	Teachers	43	1.95	0.213	
Most frequent use	Students	104	1.38	0.486	18.55^{***}
	Teachers	42	1.02	0.154	

Note. N = number of respondents; M = mean; SD = standard deviation; X^2 = Pearson's chi-square test.
$^{***}p < .001$
Source: Own elaboration

Table 3 - Matrix of responses for purposes/objectives of the use of DPTs

| Respondents		Students	Teachers
Services	Pedagogical	x	x
	Academic	x	x
	Administrative	x	x
Teaching articulation and collaboration			x
Communication	External		x
	Internal		x
Document management			x
Organization and planning of teaching work			x

Source: Own elaboration

The fact that most teachers and students have revealed that they do not use DPT for purposes other than those listed reinforces Monteiro's (2020, p. 14) conclusions, stating that, for those who participated in the research, "ICTs, even before the Covid-19 pandemic, which implemented remote study through new technologies, were inserted to a greater or lesser extent in the teaching and learning process of teaching practice".

When asked if the use of DPT was more frequent than usual, 62.5% of students and 97.6% of teachers answered positively (Figure 4). These data corroborate those of (MOREIRA et al., 2020), whose conclusion indicated that the use of DPT was already common and intensified during the quarantine period.

It can be noted that there was a significant difference ($p < .05$) between the responses of students and teachers regarding the frequency of use of DPT, with teachers reporting more frequent use than students during the pandemic. For teachers, (Figure 5), this increased frequency was for the purpose of communicating with students and monitoring students' schoolwork and tasks. In the case of students, (Figure 6), DPT was most regularly used for the submission of schoolwork and tasks for verification by teachers.

Figure 5 - Purposes and frequency with which teachers used DPT during the quarantine due to COVID-19
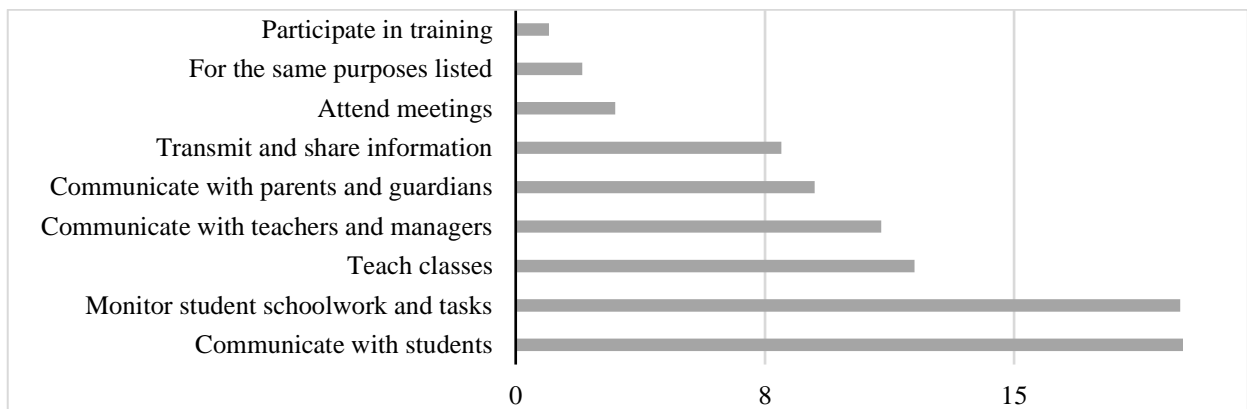
Source: Own elaboration

**Figure 6** - Purposes and frequency with which students used DPT during the quarantine due to COVID-19
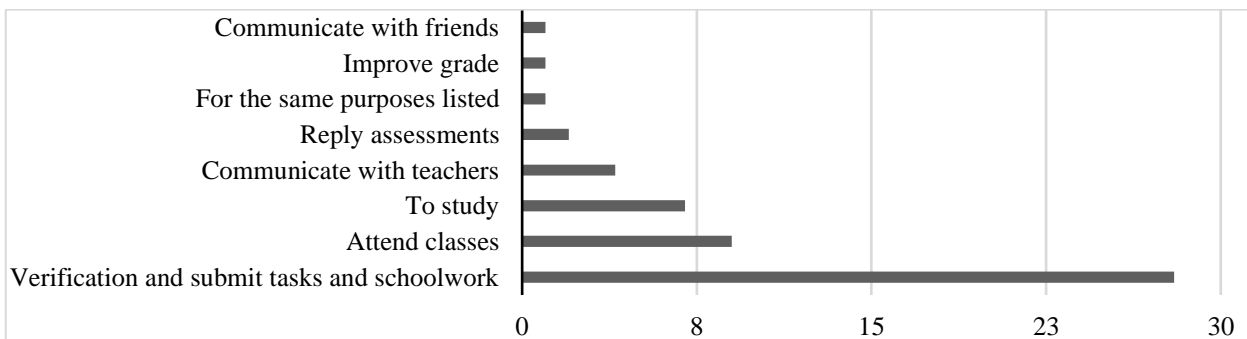
Source: Own elaboration

When asked about the problems and difficulties related to the use of DPTs in daily school activities, teachers had the most difficulties with insufficient and obsolete computer equipment and with Internet access, while for students only the latter was a major problem (Figure 7).

Teachers showed the highest levels of agreement in all the problems and difficulties present in the questionnaire.

Figure 7 - Average frequency of agreement of problems and difficulties of using PTDs
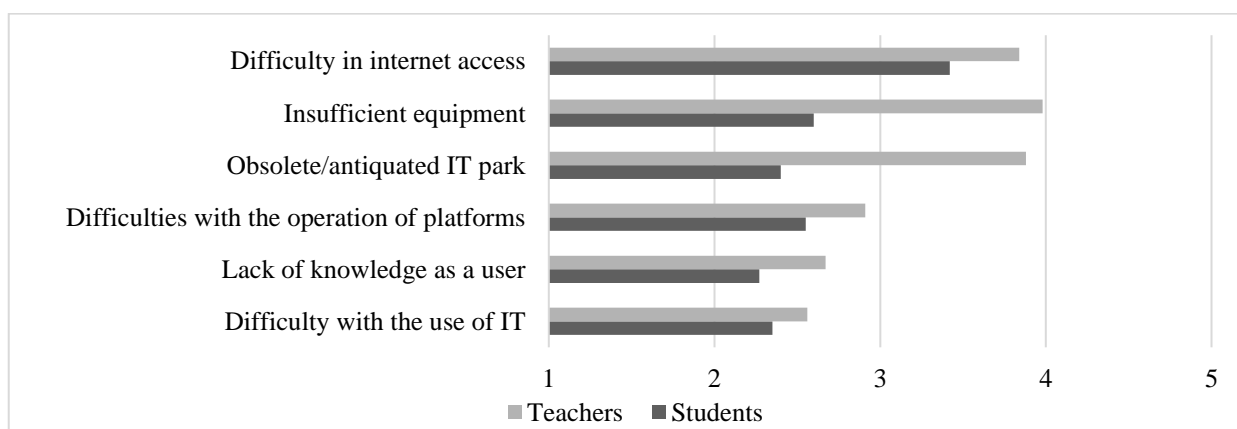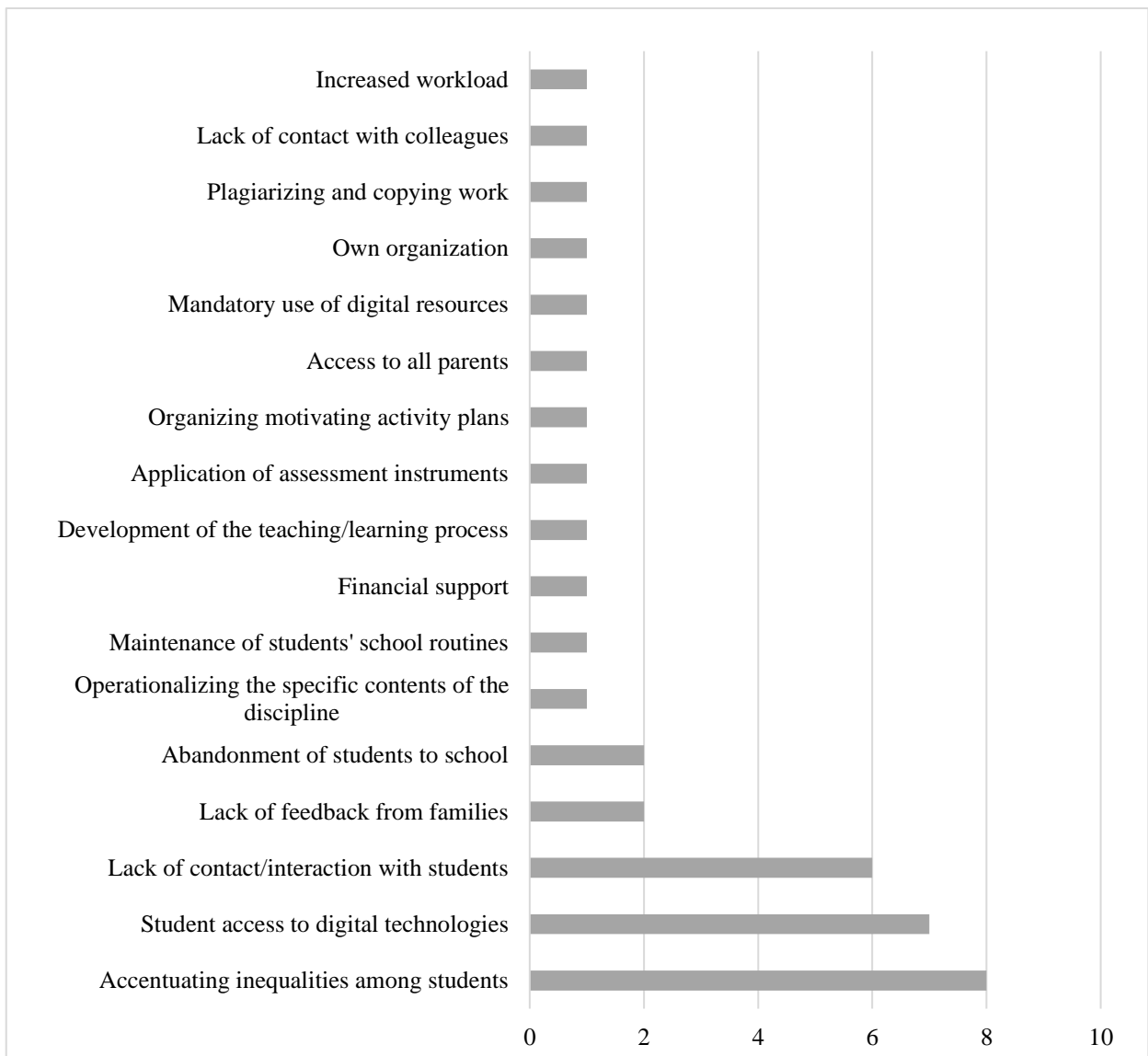

Note. 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree
Source: Own elaboration

It can be observed that the biggest problems identified by teachers are more associated with infrastructural issues than with difficulty with the use of DPTs, with lack of knowledge as user and with difficulties in the operation of the platforms. The students did not reveal difficulties with these issues either.

Adversities encountered with the obsolescence of the IT park, insufficient equipment, and difficulty in accessing the Internet were also identified by the "State of Education 2019" report (CNE, 2020). According to the document, the ICT coordinators noted the following problems regarding digital resources: broadband width, internet speed, efficient and lack of computers, computer maintenance, and lack of software. According to the Ministry of Education, 68% of the computers, tablets and iPads in Portuguese public schools used for pedagogical purposes were older than three years. Regarding Internet access, the results provided by CNE (2020) state that the weakness of the Internet network, one of the problems most frequently mentioned by ICT coordinators, covers more than 75% of students.

When asked whether they identified other difficulties during quarantine due to COVID-19, 21.6% of students and 76.7% of teachers answered yes. Teachers reported difficulties more associated with social, pedagogical, and technical aspects (Figure 8), while students reported problems more related to personal and technical factors (Figure 9).

Figure 8 - Frequency of teachers who reported other difficulties in using PTD during quarantine

Note. 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.
Source: Own elaboration

Figure 9 - Frequency of students who reported other difficulties in using PTD during quarantine
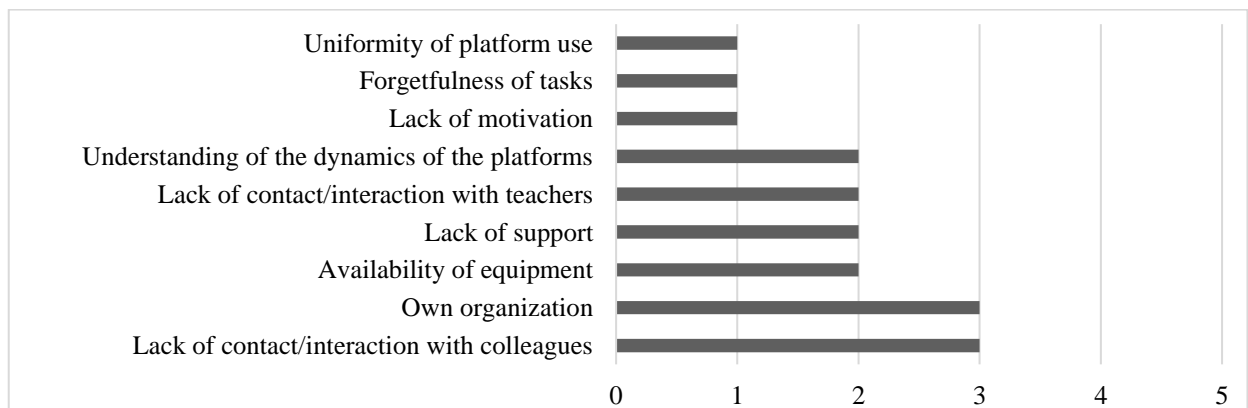
Note. 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree
Source: Own elaboration

The intensification of inequality among students and their access to DPTs, difficulties identified by teachers, are pointed out in several researches as two of the main problems associated with remote teaching during the pandemic (HONORATO; MARCELINO, 2020; LIMEIRA; BATISTA; BEZERRA, 2020; LUDOVICO et al., 2020). The problems with the absence of contact and interaction with peers and with self-organization, identified by the students, corroborate the difficulties reported by Magalhães et al. (2020), who identified a difficult adaptation of students to the absence of contact with peers and teachers. Valasques and Santos (2020), add emotional stress, lack of interest and demotivation due to social distance and the e-learning modality.

These results highlight that the pandemic has made teachers and students change their methodologies and work and study routines. During the quarantine period, it was necessary to adapt the teaching and learning process, which was associated with the greater frequency of use of DPT in order to minimize the educational losses caused by the interruption of classroom teaching. This reinforces the finding by Schneider et al. (2020) that digital information and communication technologies contribute to the creation of "different teaching and learning environments and enable a new experience" (p. 1084), both for teachers and students.

CONCLUSION

In order to compare the frequency and the purpose of use of nine DPTs by teachers and students before and during the quarantine due to COVID-19 and its influence on these characteristics of usage, this study carried out two questionnaire surveys with teachers and students from five schools in Portugal. The results showed that the teachers' average use was significantly higher than that of students for five of the nine DPTs: blog, electronic mail, clouds, school webpage and school platforms, while students presented a significantly higher average for social networks.

The analysis of the influence of the pandemic situation on the use of DPT showed that most teachers and students did not use them for purposes other than those listed in the questionnaires. However, the frequency of use during the pandemic was higher for most respondents in both groups, with teachers in particular reporting that they used DPTs more frequently.

These findings challenge the idea of digital natives and immigrants and complement findings from other research on the use of DPT in the school context, by showing that teachers use DPTs more than students in their daily routines. The results also show how teachers and students adapted their use of DPTs during the pandemic by using them more frequently than usual in order to support the teaching and learning process.

However, teachers presented greater difficulties with insufficient and obsolete computer equipment and with Internet access. Students identified only the latter as the majority problem. It is noteworthy that during quarantine, the teachers were the ones who most encountered difficulties related to social, pedagogical, and technical aspects, while the students reported problems related to personal and technical factors.

The study did not include a comparison between teachers and students of the purposes and objectives of the uses of the DPT. This limitation was due to the format of the questionnaire, which made such an analysis impossible. It is suggested, therefore, that future research be structured in order to analyze the relationship between the frequency of use of each DPT and the educational

objectives, as well as allowing a comparison between teachers and students in their use of DPT to realize these objectives.

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REFERENCES

ABREU, A.; AFONSO, A. P.; ROCHA, A.; COTA, M. P. Caderneta electrónica: visão de professores e encarregados de educação de alunos do ensino básico da galiza. In: IBERIAN CONFERENCE ON INFORMATION SYSTEMS AND TECHNOLOGIES, CISTI, 11., 2016. **Proceedings** […] Isla Gran Canaria: ASTI, 2016, p. 1065-1070.

ALJENAIBI, B. Digital media platforms and education: the uses of social networking in the UAE and China. **Journal of Media Critiques**, v. 1, n. 1, p. 47–90, 2015.

ALMEIDA, P. Tecnologias digitais em sala de aula: o professor e a reconfiguração do processo educativo. **Da Investigação às Práticas**, v. 8, n. 1, p. 4–21, 2018.

BULLEN, M.; MORGAN, T. Digital learners not digital natives. **La Cuestión Universitaria**, v. 7, p. 60–68, 2011.

CALVET, N. L.; CAVERO, O. B.; ALEANDRI, G. Digital educational platforms: an emerging school-family communication channel. In: WORLD CONFERENCE ON FUTURE OF EDUCATION, 2019. **Proceedings** […] Rome: CF Education, 2019, p. 20-29. 10.33422/wcfeducation.2019.09.517

CARVALHO, A. A. A.; MOURA, A.; SÓNIA CRUZ, L. P. Blogue: uma ferramenta com potencialidades pedagógicas em diferentes níveis de ensino. In: COLÓQUIO SOBRE QUESTÕES CURRICULARES (III COLÓQUIO LUSO-BRASILEIRO) GLOBALIZAÇÃO E (DES)IGUALDADES: OS DESAFIOS CURRICULARES, 7., 2006. **Actas** […] Braga : CIED, 2006, p. 635-652.

CNE. **Estado da educação 2019**. Lisboa: CNE, 2020.

COELHO, P. M. F.; COSTA, M. R. M.; MATTAR NETO, J. A. Saber digital e suas urgências: reflexões sobre imigrantes e nativos digitais. **Educação & Realidade**, v. 43, n. 3, p. 1077–1094, 2018.

COMISSÃO EUROPEIA. **i2010: A sociedade da informação e os media ao serviço do crescimento e do emprego**. Bruxelas: Bruxelas, 2005.

COMISSÃO EUROPEIA. Comunicação da Comissão - Europa 2020. In: **Estratégia para um crescimento inteligente, sustentável e inclusivo**. Bruxelas: Comissão Europeia, 2010a.

COMISSÃO EUROPEIA. **Communication from the commission Europe 2020: A strategy for smart, sustainable and inclusive growth**. Bruxelas: Comissão Europeia, 2010b.

COMISSÃO EUROPEIA. **Plano de ação para a educação digital 2021-2027**. Bruxelas:

Comissão Europeia, 2020.

COMISSÃO EUROPEIA. **Orientações para a digitalização até 2030: a via europeia para a década digital**. Disponível em: <https://eur-lex.europa.eu/resource.html?uri=cellar:12e835e2-81af-11eb-9ac9-01aa75ed71a1.0023.02/DOC_1&format=PDF>.

COSTA, F. J.; RIBEIRO, P. C.; FERREIRA, J. R. A distância das tecnologias digitais de informação e comunicação do ambiente escolar e a formação de professores. **Formação@Docente**, v. 8, n. 2, p. 35–47, 2013.

CRUZ, L. M. R. DA; MARINHO, S. P. Internet e escola: práticas e representações de professores de uma escola UCA em Minas Gerais. In: CONGRESSO BRASILEIRO DE INFORMÁTICA NA EDUCAÇÃO, 2012. **Anais** […] [S.l.], 2012.

EVANS, C.; ROBERTSON, W. The four phases of the digital natives debate. **Human Behavior and Emerging Technologies**, v. 2, n. 3, p. 269–277, 2020.

FANTIN, M. "Nativos e imigrantes digitais" em questão: crianças e competências midiáticas na escola. **Passagens**, v. 7, n. 1, p. 5–26, 2016.

FANTIN, M.; RIVOTELLA, P. C. Cultura digital e formação de professores:usos da mídia, práticas culturais e desafios educativos. In: FANTIN, M.; RIVOTELLA, P. C. (Eds.). **Cultura digital e escola: pesquisa e formação de professores**. Campinas: Papirus, 2012. p. 95–146.

FERNANDES, P.; FIGUEIREDO, C. Tecnologias educativas e plataformas digitais na gestão educacional: o que evidenciam os discursos académicos. **Laplage em Revista**, v. 6, n. Especial, p. 24–38, 2020.

FIELD, A. **Discovering statistics using SPSS**. 3. ed. Thousand Oaks, CA: SAGE Publications, Inc., 2009.

GHIGLIONE, R.; MATALON, B. **O inquérito. Teoria e prática**. Oeiras: Celta Editora, 1992.

HILL, M. M.; HILL, A. **Investigação por questionário**. Lisboa: Edições Sílabo, 2005.

HONORATO, H. G.; MARCELINO, A. C. K. B. A arte de ensinar e a pandemia COVID-19: a visão dos professores. **Revista Diálogos em Educação**, v. 1, n. 1, p. 208–220, 2020.

JÚNIOR, G. A. P. et al. Desenvolvimento de plataforma digital para ensino de graduação (caso do ensino de atendimento ao paciente traumatizado). **Revista de Graduação USP**, v. 2, n. 1, p. 13–23, 2017.

KIRSCHNER, P. A.; DE BRUYCKERE, P. The myths of the digital native and the multitasker. **Teaching and Teacher Education**, v. 67, p. 135–142, 2017.

LIMEIRA, G. N.; BATISTA, M. E. P.; BEZERRA, J. DE S. Desafios da utilização das novas tecnologias no ensino superior frente à pandemia da COVID-19. **Research, Society and Development**, v. 9, n. 10, p. e2219108415, 2020.

LOPES, N.; GOMES, A. O "boom" das plataformas digitais nas práticas de ensino: Uma experiência do E@D no ensino superior. **Revista Practicum**, v. 5, n. 1, p. 106–120, 2020.

LUDOVICO, F. M. et al. Covid-19: desafios dos docentes na linha de frente da educação. **Interfaces Científicas - Educação**, v. 10, n. 1, p. 58–74, 2020.

MAGALHÃES, P. et al. **O impacto social da pandemia. Estudo ICS/ISCTE Covid-19.** Lisboa: Instituto de Ciências Sociais da Universidade de Lisboa e Instituto Universitário de Lisboa, 2020.

MCLOUGHLIN, C.; LEE, M. J. W. Personalised and self regulated learning in the Web 2.0 era: international exemplars of innovative pedagogy using social software. **Australasian Journal of Educational Technology**, v. 26, n. 1, p. 28–43, 2010.

MERTALA, P.; SALOMAA, S. Looking for digital (alter) natives - why teachers ' beliefs about children matter in media education. In: FRAU-MEIGS, D. et al. (Eds.). **The handbook of media education research**. New Jersey: Wiley-Blackwell, 2020.

MONTEIRO, F. N. S. P. As tecnologias digitais no processo de ensino e aprendizagem de línguas estrangeiras - estudo de caso de escola da Rede Federal de Ensino - CE/Brasil - em contexto anterior ao da pandemia de covid-19. **Research, Society and Development**, v. 9, n. 10, p. 1–17, 2020.

MOREIRA, M. E. S. et al. Metodologias e tecnologias para educação em tempos de pandemia COVID-19. **Brazilian Journal of Health Review**, v. 3, n. 3, p. 6281–6290, 2020.

NICOLAU, R.; PESSOA, G.; COSTA, F. Que professor teremos na escola brasileira: nativo, imigrante ou e-migrante digital? In: WORKSHOP DE INFORMÁTICA NA ESCOLA (WIE 2018), 24., 2018. **Anais** […] Porto Alegre: Sociedade Brasileira de Computação, 2018 . p. 558-567.

PAPI, C. Towards a generalization of digital technology in education? In: GEORGE, É. (Ed.). **Digitalization of society and socio-political issues 1: digital, communication and culture**. 1. ed. London: ISTE Ltd, 2019. p. 179–190.

PINTO, M.; LEITE, C. As tecnologias digitais nos percursos de sucesso acadêmico de estudantes não tradicionais do Ensino Superior. **Educação e Pesquisa**, v. 46, p. 1–17, 2020.

PORTUGAL. **Resolução do Conselho de Ministros n.º 30, de 21 de abril de 2020. Aprova o Plano de Ação para a Transição Digital**. Lisboa: Diário da República, 2020.

PRENSKY, M. Digital native, digital immigrant part 1. **On the Horizon**, v. 9, n. 5, p. 2–6, 2001.

RODRIGUES, F.; BRITO, E.; GOMES, N. As plataformas digitais ao serviço da aprendizagem das línguas: primalingua – um projeto linguístico com crianças de 1º ciclo de ensino básico. In: RIBEIRO, M. D. C. A.; CHUMBO, I. (Eds.). **Communication without Borders-Selected Papers of theInternational Conference Languages 2011: X Meeting of Aprolíngu@sand II Meeting of ReCLes.pt**. Bragança: Instituto Politécnico de Bragança, 2011, p. 134-141.

SALAVATI, S. **Use of digital technologies in education: the complexity of teachers' everyday practice**. [s.l.] Doctoral dissertation. Linnaeus University, Sweden, Linnaeus University Press: Växjö., 2016.

SANTOS, M. DOS; SCARABOTTO, S. DO C. DOS A.; MATOS, E. L. M. Imigrantes e nativos digitais: um dilema ou desafio na educação? In: CONGRESSO NACIONAL DE EDUCAÇÃO -

EDUCERE, 10., 2011. **Anais** […] Curitiba: PUCPR, 2011, p. 15840-15851.

SCHNEIDER, E. M. et al. O uso das tecnologias digitais da informação e comunicação (Tdic): possibilidades para o ensino (não) presencial durante a pandemia Covid-19. **Revista Educ@ção Científica**, v. 4, n. 8, p. 1071–1090, 2020.

SMITH, E. E.; KAHLKE, R.; JUDD, T. Not just digital natives: integrating technologies in professional education contexts. **Australasian Journal of Educational Technology**, v. 36, n. 3, p. 1–14, 2020.

SUN, Y.; GAO, F. Exploring the roles of school leaders and teachers in a school-wide adoption of flipped classroom: school dynamics and institutional cultures. **British Journal of Educational Technology**, v. 50, n. 3, p. 1241–1259, 2019.

UNESCO. **Marco de competencias de los docentes en materia de TIC**. Paris: UNESCO, 2019.

VALASQUES, D.; SANTOS, H. Impactod do Covid-19: as visões e experiências de crianças e jovens portuguêses em situação de acolhimento residencial. **Revista Artes e Educar**, v. 6, n. Especial, p. 58–80, 2020.

VALENTE, J. **Tecnologia, informação e poder: das plataformas online aos monopólios digitais**. [s.l.] Dissertação de Doutorado. Universidade de Brasília, Brasília, Brasil, 2019.

WANG, S. K. et al. An investigation of middle school science teachers and students use of technology inside and outside of classrooms: considering whether digital natives are more technology savvy than their teachers. **Educational Technology Research and Development**, v. 62, n. 6, p. 637–662, 2014.

WAYCOTT, J. et al. Digital divides? Student and staff perceptions of information and communication technologies. **Computers and Education**, v. 54, n. 4, p. 1202–1211, 2010.