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Advantages and difficulties in the use of digital platforms and technologies by teachers and students

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ABSTRACT

This study analyzes the advantages and difficulties of teachers and students regarding the use of a selection of nine digital platforms and technologies for daily school activities and verifies whether the situation resulting from the quarantine due to covid-19 generated other problems in the use of those digital platforms and technologies. Questionnaires were applied to 105 students and 45 teachers in five schools in Portugal. The results revealed that teachers and students agreed with the advantages and contributions of the use of digital platforms and technologies. As for the difficulties, the teachers pointed out problems with the obsolescence and the insufficiency of the equipment and with the internet access presented as the main ones encountered when using the digital platforms and technologies. The students indicated internet access as their main difficulty. During the pandemic, teachers reported difficulties more associated with social, pedagogical, and technical aspects, while students related it more to personal issues.

KEYWORDS

teachers; students; digital platforms; digital technologies; covid-19.

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VANTAGENS E DIFICULDADES NA UTILIZAÇÃO DE PLATAFORMAS E TECNOLOGIAS DIGITAIS POR PROFESSORES E ALUNOS

RESUMO

O estudo analisa as vantagens e as dificuldades encontradas por professores e alunos quanto ao uso de uma seleção de nove plataformas e tecnologias digitais em atividades escolares e verifica se a situação decorrente da quarentena devida à covid-19 gerou outros problemas no uso dessas plataformas e tecnologias digitais. Foram aplicados questionários a 105 alunos e 45 professores de cinco agrupamentos de escolas de Portugal. Os resultados revelaram que professores e alunos concordaram com as vantagens e os contributos da utilização das plataformas e tecnologias digitais. Quanto às dificuldades, os professores assinalaram que a obsolescência e a insuficiência do parque informático e o acesso à internet apresentaram-se como os principais problemas encontrados ao utilizar as plataformas e tecnologias digitais. Já os alunos indicaram como principal dificuldade o acesso à internet. Durante a pandemia, os professores relataram dificuldades mais associadas aos aspetos sociais, pedagógicos e técnicos, enquanto os alunos relacionaram-nas mais com questões pessoais.

PALAVRAS-CHAVE

professores; alunos; plataformas digitais; tecnologias digitais; covid-19.

VENTAJAS Y DIFICULTADES EN EL USO DE PLATAFORMAS Y TECNOLOGÍAS DIGITALES POR PROFESORES Y ALUMNOS

RESUMEN

El estudio analiza las ventajas y dificultades que encuentran los docentes y alumnos con respecto al uso de una selección de nueve plataformas y tecnologías digitales en las actividades escolares diarias, además de verificar si la situación resultante de la cuarentena por covid-19 generó otros problemas en el uso de estas plataformas y tecnologías digitales. Se aplicaron unos cuestionarios a una población compuesta por 105 alumnos y 45 maestros de cinco grupos escolares de Portugal. Los resultados revelaron que docentes y estudiantes coincidieron con las ventajas y aportes del uso de las plataformas y tecnologías digitales en los procesos de enseñanza-aprendizaje. En cuanto a las dificultades encontrados al utilizar las plataformas y tecnologías digitales en sus actividades escolares, los docentes señalaron problemas con la obsolescencia de los equipos y con el acceso a internet, todavía los alumnos señalaron el acceso a internet como su principal dificultad. Durante la pandemia, los docentes señalaron dificultades más asociadas a aspectos de tipo social, pedagógico y técnico, mientras los alumnos destacaban los aspectos personales.

PALABRAS CLAVES

profesores; estudiantes; plataformas digitales; tecnologías digitales; covid-19.

INTRODUCTION

Digitization has provided relevant changes in several areas of today's society. Information, service delivery and goods acquisition systems, for example, underwent a technological revolution in order to adapt to this new era (Almeida, 2018). According to the author, "[…] society is surrendered to Digital Technologies (DT), mostly associated with the improvement of living and working conditions." (*ibidem*, p. 6, our translation).

Consequently, the digital world also had repercussions in the school context (Aljenaibi, 2015), giving rise to a range of potential possibilities for the teaching and learning process (Almeida, 2018). Calvet, Cavero and Aleandri (2019) argue that the introduction of information and communication technologies (ICT) is a clear need for schools to respond to new social demands. For Aljenaibi (2015, p. 48, our translation), "[…] digital technologies are transforming the learning environment not only to provide exciting new learning tools but to meet the changed literacy needs of students.".

The school presents itself as a special niche for the insertion of digital technologies, mainly for those incorporated in the teaching process (Silva and Teixeira, 2020). According to Pereira Júnior *et al.* (2017, p. 14, our translation), "[…] from the perspective of education, technology adds values that create new didactic forms for the transmission of information, enabling a teaching closer to reality, changing the role of the educator in relation to the student.". Lopes and Gomes (2020, p. 111, our translation) corroborate the idea, claiming that digital platforms

> […] are excellent resources for education, as they make it possible to organize and manage distance classes/training in an integral way or even to support students of the most diverse educational levels, who for various reasons cannot participate in person teaching. In their most varied abilities, they can be used to transmit content and activities, monitor students' work, sort out doubts and create spaces for interactive communication, and assess students' progress. In addition, they are also useful to create discussion and workspaces for research groups, implementing virtual communities and learning networks around themes of common interest.

Moran (2017) claims that the ease of access to digital technologies, most of which are integrated into smartphones, allows teachers to: motivate students, mainly through game platforms and videos from interesting websites or prepared by the teacher himself; invert the way of teaching, posting videos, texts or presentations, for example, on a digital platform, so that students can access them before the in person class, which is used to answer questions and focus on studying; to personalize the learning process, designing scripts and individual activities that allow students to study and progress at their own pace; and to publish and share learnings.

According to Dotta, Monteiro and Mouraz (2019), from the students' perspective, the use of these technologies in teaching and learning processes brings many benefits. The authors state that ICT have "[…] the potential to promote improvement

in their learning, stimulate and develop the construction and creation of ideas by students, facilitate the formulation of hypotheses, allow them to learn in community and develop meaningful learning." (Dotta Monteiro and Mouraz , 2019, p. 48, our translation). Aljenaibi (2015) corroborates the idea, claiming that, when used correctly, new technologies provide the improvement of students' skills, allow them to be more active and enable greater self-regulation. The author also adds that digital technologies provide social benefits to students, related to their greater participation in the social context where they live through the sharing of information and news.

Furthermore, the use of digital technologies favors access to information and the construction of learning (Pinto and Leite, 2020). The authors clarify that the use of these technologies "[…] may have effects on the time dedicated to the interaction between students and teachers, continuing beyond the walls of the classroom, in a process of involvement, sharing of content and study and communication materials." (*ibidem*, p. 3, our translation). For Pereira Júnior *et al.* (2017), the use of digital platforms facilitates the composition of groups for problem solving and the development of communication skills while continuing the topic being studied. Al-Atabi and Alsalihi (2020) also state that the use of digital platforms allows students to access classes and digital content at any time and reduces the anxiety and stress of most students who do not feel comfortable expressing themselves in front of everyone in the classroom.

Schneider *et al.* (2020, p. 1082, our translation) state that, by exploring the different uses of digital information and communication technologies, "[…] possibilities are created to assist in the development of the teacher's work and in student learning.". As the authors state, digital information and communication technologies can be used, for example, to plan and elaborate didactic materials, to send and exchange information, for dialogical interaction and to bring together and motivate students outside the classroom.

However, the literature indicates that the use of digital technologies in the school context still does not happen effectively (Dotta, Monteiro and Mouraz, 2019) and presents certain aspects that act as a barrier in the paths of technologies and digital platforms (Calvet, Cavero and Aleandri, 2019). These aspects are mainly related to the equipment, time spent accessing it, preparation, technical support, and teachers' beliefs and attitudes towards the use of digital technologies in the classroom (Bordalba and Bochaca, 2019; Calvet, Cavero and Aleandri, 2019; Papi, 2019).

In their research, Calvet, Cavero and Aleandri (2019) reported that teachers' main barriers were related to time, attitudes, and preparation. For the authors (Calvet, Cavero and Aleandri, 2019, p. 5, our translation), the main disadvantages, on the teachers' side, are

> […] the "slavery" towards these tools, having to be aware of the messages received and answer them as soon as possible, as well as the personal time required to do so. Also, the time used to select and send informative notes, messages, photos, etc. Time that is often not counted within the hours of working. Other barriers would be: lack of digital competence, insufficient training both in the management of ICT and in audiovisual culture.

Similarly, Almeida (2018) reinforces that issues related to overwork and lack of time to prepare classes are common complaints from teachers regarding the use of digital technologies. The author (Almeida, 2018, p. 9, our translation) also adds, as possible obstacles to the use of digital technologies in the classroom,

> […] teachers' beliefs and perceptions, the offer of teacher training centers, the DT [digital technologies] made available by government bodies and school boards and the quantity or quality of educational resources provided by publishers (it should be noted that these are not limited to publishers).

In 2015, a survey coordinated by the Scottish government prepared a bibliographic survey on the impact of digital technology on teaching and learning (Scotland, 2016). The study focused on the contributions of digital technology related to five educational priorities: raising the level of skills; combating inequalities and promoting inclusion; improving the transition into employment; increased parental involvement; and improving the efficiency of the education system. The review revealed that, "[…] if there is sufficient access to equipment, tools and resources and if there is sufficient training and support for educators, then digital technology can have a positive impact on all five of the educational priorities in question" (Scotland, 2016, p. 11).

Portugal, like other countries in the European Union, adopted policies for the integration of ICT in its educational system (Rodrigues, 2017). Almeida (2018, p. 12, our translation) states that "[…] from 1985 (Minerva project) to 2007 (Technological Plan for Education), national initiatives were implemented to implement digital practices for teachers and students.". The Minerva project "[…] constituted the first and widest project ever carried out in Portugal in the area of ICT, involving schools of all levels of education, polytechnic institutes and universities, in the promotion of the use of the computer as an educational tool." (Miguéns, 2017, p. 7, our translation) and the Technological Education Plan was considered the largest technological modernization program for Portuguese schools, whose ambition was to "[…] place Portugal among the five most advanced European countries in terms of technological modernization of schools by 2010." (DGEEC, 2007, p. 1, our translation).

Almeida (2018, p. 12, our translation) also points out the creation of the subject ICT, in 2005, and the "[…] reference to DT in Portuguese curricula as a transversal component, respecting the recommendations of UNESCO (1982, 2011) in the digital literacy scope.".

In 2020, Portugal ranked 19th among the 28 member states of the European Union in the Digital Economy and Society Index (DESI) (Comissão Europeia, 2020). This is an European index that summarizes relevant indicators on digital performance and tracks the evolution of the European Union member states in terms of digital competitiveness. According to the European Commission (Comissão Europeia, 2020, p. 3, our translation), over the last few years, and according to pre-pandemic data, Portugal has increased its score in line with the EU average; however,

[…] the country continues to perform poorly by European standards in terms of human capital and use of internet services. In terms of connectivity, Portugal is down one place compared to the previous year's ranking but has an overall above average score.

It is necessary to take into account that, in 2020, the situation of the pandemic due to covid-19 changed the way and frequency of use of platforms and digital technologies in the educational environment. As a result of the quarantine, education systems needed to find strategies, which have potential and limitations, to adapt and overcome adversities in all processes involving remote teaching and learning (Rondini, Pedro and Duarte, 2020).

It is in this scenario that this study emerged with the goal to analyze the advantages and contributions and the problems and difficulties encountered by teachers and students from five school groups in Portugal regarding the use of nine digital platforms and technologies (DPT) (virtual environments, Microsoft Office, blog, electronic notebook, e-mail, clouds, school page, school platforms and social networks) in their daily school activities. The study also aimed to verify whether the situation arising from the quarantine due to covid-19 generated other problems and difficulties in these activities and sought to identify them.

METHODOLOGY

The work presented here is part of a study carried out within the scope of an ongoing research project, funded by the Fundação para a Ciência e a Tecnologia (FCT), with the aim to identify and characterize the ways and purposes with which DPT are used in school clusters. For data collection, four questionnaire surveys were built, aimed at teachers, top leadership, technical assistants, and students, taking into account the different sociodemographic specificities and use of platforms and digital tools by these educational actors.

The questionnaires obeyed a common matrix, consisting of four groups of questions, with the internal organization assuming small variations depending on the recipients:

1. sociodemographic characterization of the participants;
2. assessment of the degree of knowledge and use in relation to different platforms and digital technologies;
3. knowledge of the effects of using digital platforms and technologies; and
4. characterization of the community's educational agents with regard to training in ICT/platforms and digital technologies (this last group appears only in the questionnaires for leadership and teachers).

In view of the pandemic situation, some questions were included about possible divergences arising from this situation. Questions of different typologies were used: multiple choice, open answer and dichotomous scales (yes and no) and Likert-type scales that are particularly useful for measuring attitudes, perceptions and opinions, and the use of different response scales makes it possible to make the more sensitive and responsive data (Cohen, Manion and Morrison, 2007).

In Chart 1, we present the global matrix of the questionnaires applied to teachers and students, with the respective questions, which were carefully designed, with respect for the various technical principles, and the anonymity and confidentiality of the data were ensured through information prior to the questionnaire.

Chart 1 – Global matrix of questionnaires.

Groups	Questions	Answer type
Group 1. **Sociodemographic data**	- Students: gender, age, year of schooling, subject area education/literary qualifications of father and mother. - Teachers: gender, age, educational qualifications, subject area, seniority in the profession, current position, and seniority in it.	
Group 2. **Use of digital platforms and technologies**	Students and teachers: - DPT who knows - DPT that is most used in the day-to-day context - Purposes/objectives for which you use the DPT With the quarantine situation due to covid-19 the DPT: - "were used for other purposes" "which ones" - "were used more frequently than usual" "for what purposes" - DPT who knows Teachers: - DPT used in day-to-day internal and external communication	- Multiple choice - 5-point Likert-type scale (1 = never to 5 = always) - Multiple choice - Dichotomous scale (Y/N) + open response - Dichotomous scale (Y/N) + open response - 5-point Likert-type scale (1 = never to 5 = always)
Group 3. **Effects of using digital platforms and technologies**	Select from a list: - "advantages" - "problems and difficulties The quarantine situation due to covid -19: - "generated other problems and/or difficulties" "which ones"	- 5-point Likert-type scale - (1 = completely disagree to 5 = completely agree) - Multiple choice + open response - Dichotomous scale (Y/N) + open answer
Group 4. **Training of educational agents**	- Degree of knowledge of "national and international documents and projects for the use of DPT" - Conducting "continuous training" "specify" - "involvement in ICT projects in the school clusters" "specify"	- 3-point Likert-type scale (1 = I don't know/never heard of it to 3 = I know it very well) - Dichotomous scale (Y/N) + - Open answer - Dichotomous scale (Y/N) + open answer

DPT: digital platforms and technologies; ICT: information and communication technologies.
Source: Elaborated by the authors.

The validity of the instrument was checked by consulting specialists ("judges panel") and by carrying out a pre-test on a sample selected "for convenience" (Ghiglione and Matalon, 1992; Hill and Hill, 2005), consisting of school clusters, chosen due to the privileged relationship between these directors and the project's researchers, located in five different territorial units (North, Centre, Metropolitan Area of Lisbon, Alentejo and Algarve). The pre-test of the four questionnaires was applied in an online version on the Google forms platform, during the months of June and July 2020, and the respondents were defined according to the following criteria: Leadership Questionnaire — responds the principal and all members of the board; Technical Assistants Questionnaire — all respond; Students Questionnaire — students from three classes respond, one from each final year of the cycle (6th, 9th and 12th years); Teachers Questionnaire — respond all professors of the Pedagogical Council, thus guaranteeing the representativeness of the faculty.

It should be mentioned that this data collection took place under particular conditions due to the pandemic, but similar to those of the definitive application. The procedures were identical in all groups of schools, with links to access the questionnaires being sent to principals in the first week of June.

DATA ANALYSIS

The statistical analysis comprised the frequency analyses, Student's t-test and correlation analysis, all performed using the Statistical Package for the Social Sciences (SPSS) software. The frequency analyzes were carried out to:

- identify the frequencies of agreement between students and teachers regarding the categories of advantages and difficulties in the use of DPT;
- identify the percentage of students and teachers who stated that the situation resulting from the quarantine due to covid-19 generated other problems and difficulties in the use of DPT; and
- identify the attendance of students and teachers due to other problems and difficulties arising from the quarantine due to covid-19.

The Student's t-test for independent samples was used to compare the means of agreement on the advantages and difficulties in the use of DPT by students and teachers. As a condition for applying Student's t-test, all variables used followed a normal distribution pattern.

Lastly, Pearson's correlation analysis was performed to estimate the correlation between the average frequency of general use of DPT and the level of agreement on advantages and difficulties in using DPT by students and teachers. The average frequency of general use of DPT was obtained from the creation of a new variable, called "average use of DPT", composed of the means of use of the nine DPT, whose Cronbach's alpha coefficients for students and teachers were .65 and .53, respectively.

RESULTS AND DISCUSSION

Next, the data obtained from the Students Questionnaire and the Teachers Questionnaire are presented. The total number of respondents was 148, of which 105 are students (14 from the 6th year, 48 from the 9th year and 43 from the 12th year) and 43 are teachers.

Regarding the research questions: what are the advantages and potential indicated by teachers and students regarding the use of DPT? What differences exist between teachers and students, regarding the perception of the advantages and potential of using DPT? What are the problems and difficulties pointed out by teachers and students regarding the use of DPT? What differences exist between teachers and students, regarding problems and difficulties in using DPT? What other problems and difficulties in the use of DPT have arisen with the pandemic?

ADVANTAGES AND POTENTIALITIES IN THE USE OF DIGITAL PLATFORMS AND TECHNOLOGIES

The results of the analysis of the level of agreement between teachers and students regarding the advantages and possible contributions of using DPT (Figure 1 and Chart 2) revealed that, in general, teachers have higher average levels of agreement than students. It was also evident that the agreement between professors and students presents a statistically significant difference ($p < 0.05$) in 4 of the 11 categories, namely: they allow a more interactive pedagogical interaction; increase knowledge; improve communication between teacher and student; and contribute to better overall communication.
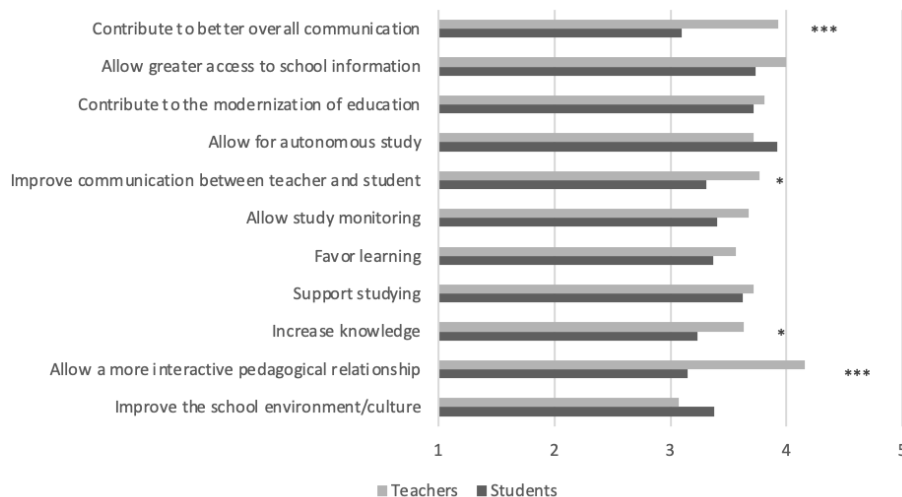

Figure 1 – Average frequency of agreement on the advantages and possible contributions of using digital platforms and technologies, from students and teachers.
1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree; * $p < 0.05$; *** $p < 0.001$.
Source: Elaborated by the authors.

In these categories, teachers indicated that they agreed more with the advantages and possible contributions of using digital platforms than students. However, the agreement average of professors and students were above level 3 (I neither agree nor disagree) and the mode was at level 4 (I agree) in the four categories, with the exception of the category "contribute to a better general communication", of the students, in which the mode was three.

Chart 2 – Average difference in agreement of advantages and possible contributions of digital platforms and technologies, students, and teachers.

Advantages and contributions	Respondents	n	M	SD	t(gl)
Improve the school environment/culture	Students	102	3.38	0.91	1.78 (143)
	Teachers	43	3.07	1.08	
Allow a more interactive pedagogical relationship	Students	105	3.15	1.06	**-6.38 (104.94)***
	Teachers	43	4.16	0.78	
Increase knowledge	Students	104	3.23	0.98	**-2.33 (82.46) ***
	Teachers	43	3.63	0.93	
Support studying	Students	103	3.62	0.86	-0.62 (144)
	Teachers	43	3.72	0.93	
Favor learning	Students	105	3.37	0.92	-1.13 (146)
	Teachers	43	3.56	0.88	
Allow study monitoring	Students	104	3.40	0.93	-1.68 (145)
	Teachers	43	3.67	0.78	
Improve communication between teacher and student	Students	104	3.31	1.13	**-2.57 (95.63)***
	Teachers	43	3.77	0.92	
Allow for autonomous study	Students	105	3.92	0.86	1.27 (146)
	Teachers	43	3.72	0.93	
Contribute to the modernization of education	Students	105	3.72	1.00	-0.52 (146)
	Teachers	43	3.81	0.88	
Allow greater access to school information	Students	104	3.73	0.87	-1.77 (145)
	Teachers	43	4.00	0.76	
Contribute to better overall communication	Students	105	3.10	1.17	**-5.53 (134.96)***
	Teachers	43	3.93	0.63	

n = number of respondents; M = mean; SD = standard deviation; t = Student's t-test; * p < 0.05; *** p < 0.001.
Source: Elaborated by the authors.

For the other categories, there was no statistically significant difference between the responses of teachers and students. However, in both questionnaires, the mode of responses for these categories was four, with exceptions observed in the category "improve the school environment/culture" of both questionnaires, whose mode for the level of agreement was three.

It is noticed that, in general, teachers and students agree with the advantages and possible contributions of using the DPT listed in the questionnaires. These results agree with those of Calvet, Cavero and Aleandri (2019), when stating that, among the potentialities of the use of educational digital platforms, it can be seen that they provide new learning and interaction environments between teachers and students and manifest themselves as an important channel of information and communication.

They also agree with what was proposed by Rodrigues, Brito and Gomes (2011), by Aljenaibi (2015) and by Pinto and Leite (2020), who claim that DPT, among other factors, enable greater access to educational and collaborative content and provide new possibilities for communication and interaction between teachers and students.

Regarding the significant difference between the level of agreement of teachers and students in the four mentioned categories, this can be explained by the fact that teachers are going through a process of adaptation to the digital culture. In this transition, they can be led to consider that the use of DPT, when compared to traditional teaching in the classroom, improves interactivity and communication in the pedagogical relationship, as well as promotes an increase in students' knowledge.

In the case of students, they grew up immersed in this culture and, therefore, may not consider such categories as advantages or potentialities of using DPT, but as something natural. This possible explanation finds shelter in Bullen and Morgan (2011), when they state that students use digital technologies more often than teachers, and in Coelho, Costa and Mattar Netto (2018), who claims that students were born in the digital age and that teachers need to adapt to it.

By analyzing the correlation between the average frequency of use of DPT by students and teachers (Chart 3), it is possible to identify that, in the case of teachers, there was a significantly positive correlation ($p < 0.05$) between the average frequency of use of the DPT and the level of agreement in the categories "support studying", "allow a follow-up of the study", "allow an autonomous study", "allow greater access to school information", indicating that the greater the use of the DPT, the greater the level of agreement for the referred advantages and

Chart 3 – Correlation coefficient between the average frequency of use of digital platforms and technologies and the level of agreement of advantages and contributions of digital platforms and technologies, by students and teachers.

Advantages and contributions	Average use of DPT by students	Average use of DPT by teachers
Improve the school environment/culture	0.12	0.21
Allow a more interactive pedagogical relationship	0.04	0.16
Increase knowledge	0.12	0.17
Support studying	-0.02	**0.45****
Favor learning	0.11	0.20
Allow study monitoring	**0.21***	**0.31***
Improve communication between teacher and student	0.15	0.13
Allow for autonomous study	-0.06	**0.45****
Contribute to the modernization of education	0.12	0.28
Allow greater access to school information	**0.30****	**0.34***
Contribute to better overall communication	0.14	0.09

DPT: digital platforms and technologies; * correlation is significant at the 0.05 level (bilateral); ** correlation is significant at the 0.01 level (bilateral).
Source: Elaborated by the authors.

potentialities. In the case of students, there was a significantly positive correlation ($p < 0.05$) between the average use of DPT and the level of agreement in the categories "allowing study follow-up" and "allowing greater access to school information". These results indicate that the greater the use of DPT, the greater the levels of agreement of students with the advantages of using these in monitoring the study and in accessing school information.

It is noticed that the average use of DPT by teachers presents greater correlations with the advantages and possible contributions of its use than that of students. This fact is in accordance with the data in Chart 2 and Figure 1, which show that the average frequency of agreement on the potentialities of using DPT is higher for teachers than for students, suggesting that teachers consider that their use in the school environment presents greater advantages and contributions than students.

PROBLEMS AND DIFFICULTIES IN USING DIGITAL PLATFORMS AND TECHNOLOGIES

The analysis of the level of agreement of professors and students regarding the problems and difficulties of using DPT (Figure 2 and Chart 4), revealed greater agreement of professors in the categories "insufficient equipment", "outdated/obsolete computer park" and "difficulty accessing the internet", while among students the greatest agreement was recorded in the category "difficulty accessing the internet".
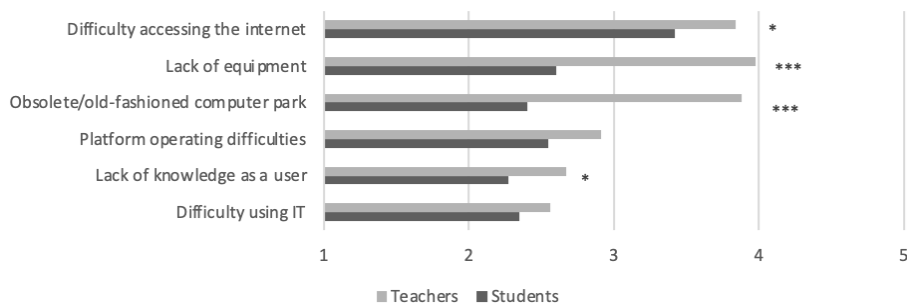

Figure 2 – Average frequency of agreement on problems and difficulties in using digital platforms and technologies, by students and teachers.
IT: information technology; 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree; * $p < .05$; *** $p < .001$.
Source: Elaborated by the authors.

It is noted that teachers had higher levels of agreement in all categories, being statistically significant ($p < 0.5$) in four of the six categories. In the two categories in which the difference between teachers' and students' responses was not statistically significant ($p > 0.5$), the average of teachers' and students' responses was, respectively, 2.56 and 2.35, whose mode is 2 (disagree). In this sense, in general, both seem to disagree that the difficulties with the use of information technology (IT) and the operation of DPT are problems that arise in their use.

The results reveal that the biggest problems and difficulties pointed out by the teachers regarding the use of DPT are associated with the obsolescence of the computer park, the lack of equipment and the difficulty in accessing the internet.

Chart 4 – Average difference of problems and difficulties in the use of digital platforms and technologies by students and teachers.

Problems and difficulties	Respondents	n	M	SD	t(gl)
Difficulty using IT	Students	104	2.35	1.05	-1.08 (145)
	Teachers	43	2.56	1.14	
Lack of knowledge as a user	Students	105	2.27	1.00	**-2.03 (69.54)***
	Teachers	43	2.67	1.15	
Platform operating difficulties	Students	104	2.55	1.06	-1.83 (145)
	Teachers	43	2.91	1.13	
Obsolete/old-fashioned computer park	Students	104	2.40	1.03	**-7.42 (145)***
	Teachers	43	3.88	1.26	
Lack of equipment	Students	104	2.60	1.14	**-6.83 (145)***
	Teachers	43	3.98	1.06	
Difficulty accessing the internet	Students	103	3.42	1.22	**-2.13 (93.02)***
	Teachers	43	3.84	1.02	

IT: information technology; n = number of respondents; M = mean; SD = standard deviation; t = Student's t-test; * p < 0.05; *** p < 0.001.
Source: Elaborated by the authors.

These adversities were also reported by the National Education Council (CNE, 2020). According to the report, the ICT coordinators of the schools participating in the research indicated as existing problems in the school, related to digital resources, "[…] insufficient bandwidth or internet speed, the lack of computers or the lack of efficient computers and the problems associated with computer maintenance […]" (*ibidem*, p. 69, our translation), as well as the lack of software.

Regarding the obsolescence of equipment, the results are in line with those presented by the Portuguese Ministry of Education, which identified that 91% of non-portable computers, 73% of portable computers and 37% of tablets/iPads in Portuguese educational establishments are older than three years. Of these, 76% of computers and 96% of tablets/iPads have internet access (DGEEC, DSEE and DEEBS, 2020). According to the CNE (2020, p. 313, our translation), the computer equipment in Portuguese schools "[…] shows some wear and tear since, in 2018/2019, the percentage of computers over three years old, despite being lower than in the previous year (-1.4 p.p.), is still very significant (83.7%).".

In regard to insufficient equipment, the results presented corroborate the data published by DGEEC, DSEE and DEEBS (2020), which reveal that, in the Portuguese public education, the average number of students per computer is 4.7. The first cycle of basic education registers the highest number of students per computer, 6, while the lowest values are in secondary education, 4.1 (CNE, 2020).

Concerning the internet access, the results support those provided by the CNE (2020, p. 69, our translation), according to which "[…] the weakness of the internet

network was the problem most mentioned by ICT coordinators, covering more than 75% of students.". Data published by DGEEC, DSEE and DEEBS (2020) reveal that the average number of students per computer connected to the internet in public schools is 5, with the second cycle of basic education being the one with the highest number, 5.1, and secondary education the one with the lowest value, 3.1.

It is noted that the biggest problems and difficulties pointed out in the use of DPT by teachers are more related to infrastructural issues and access to the internet than with the difficulty in using it, the lack of knowledge and the difficulty in its operation. However, when analyzing the correlation between the average frequency of use and the possible problems and difficulties in its use (Chart 5), the results of the teachers revealed negative and significant correlations ($p < 0.05$) between the average frequency of use of DPT and the difficulty with the use of IT and the lack of knowledge as a user. This means that teachers use digital platforms less frequently, as they agree that the difficulty with using ICT and the lack of knowledge as a user are problems for its use.

These data, associated with those in Figure 3, which reveal that, while the majority of teachers attended some training in the area of digital technologies, the minority is involved in some ICT project at school, which reflects the fact that the

Chart 5 – Correlation between the average frequency of use of digital platforms and technologies and the level of agreement of problems and difficulties in using digital platforms and technologies, by students and teachers.

Problems and difficulties	Average use of DPT by students	Average use of DPT by teachers
Difficulty using IT	-0.094	**-0.333***
Lack of knowledge as a user	-0.118	**-0.314***
Platform operating difficulties	-0.133	-0.274
Obsolete/old-fashioned computer park	**-0.203***	-0.090
Lack of equipment	-0.048	0.068
Difficulty accessing the internet	-0.039	0.090

IT: information technology; DPT: digital platforms and technologies; * correlation is significant at the 0.05 level (bilateral).
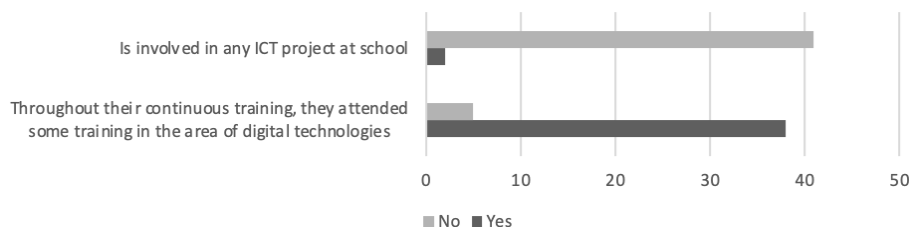Source: Elaborated by the authors.

Figure 3 – Frequency of teachers who, throughout their continuous training, attended some training in the area of digital technologies and who are involved in some information and communication technologies project at school.
ICT: information and communication technologies.
Source: Elaborated by the authors.

Portuguese educational system, unlike about half of European education systems, does not present policies for the promotion of ICT teachers or teachers specialized in digital education (Agência de Execução Europeia da Educação e da Cultura, 2019; CNE, 2020). Designated as "digital coordinators", these teachers support their peers in the use of DPT in the educational process, covering technical and pedagogical aspects (CNE, 2020).

Associated with this reality is the fact that Portuguese teachers have participated in few training activities in the field of ICT and, although they have contact experience and familiarity with the use of DPT for teaching, these factors do not translate into effective teaching practices. With digital resources (CNE, 2020). According to the CNE report (*ibidem*, p. 77), "[…] only 49% of respondents claim to use ICT daily while teaching, an amount that is in line with the international average.".

Regarding the students, the highest frequency of agreement regarding problems and difficulties in using DPT was identified in the internet access category. This is a problem that has also been reported by the OECD (2020). According to the report "Effective Policies, Successful Schools", only 32% of Portuguese students agree with the fact that the internet speed is sufficient for their daily school activities, contrasting with the 67.5% of the OECD average. In the same report, 47.5% of students admitted that the number of digital devices connected to the internet is sufficient; 39.7% agree that the number of digital devices for classes is sufficient; and 30.7% that digital devices in schools are powerful in computing capacity (OECD, 2020).

Currently, educational establishments in mainland Portugal have 194,927 computers with internet connection (DGEEC, DSEE and DEEBS, 2020). According to the Ministry of Education, of this total, only 11% have worked for an amount of time of less than or equal to 3 years (*ibidem*). In this sense, and taking into account that current students experience a connected digital world (Kirschner and Bruyckere, 2017), whose access to classes, resources and digital content often depends on access to the internet (Al-Atabi and Alsalihi, 2020), it is to be expected that, when the quality of access is low or non-existent, this factor presents itself as a clear problem for the use of DPT for school purposes, both by students and teachers, as seen previously.

Regarding the analysis of the correlation between the average frequency of use of DPT and the level of agreement of problems and difficulties in using these by students, the only negative correlation, that is statistically significant ($p < 0.05$), was verified between the average of use and the category "obsolete/old-fashioned computer park", indicating that students use DPT less frequently the higher the level of agreement in relation to the obsolescence of the computer park. This fact can be found in the official statistical information regarding the technological resources existing in teaching establishments in mainland Portugal under the tutelage of the Ministry of Education, which found that only 16% of the computer equipment in Portuguese schools has existed for less than or equal to three years, with most computers (85%) intended for educational purposes (DGEEC, DSEE and DEEBS, 2020).

PROBLEMS AND DIFFICULTIES IN THE USE OF DIGITAL PLATFORMS AND
TECHNOLOGIES DUE TO COVID-19

When asked whether the situation arising from the quarantine due to covid-19 generated other problems and difficulties regarding the use of DPT, 76.7% of teachers and 21.6% of students answered yes (Figure 4 and Chart 6). There is a significant difference ($p < 0.05$) between the responses of the two groups, showing that teachers reported greater adversities in the use of DPT during remote teaching.

It is also observed that the type of problems and difficulties arising from the quarantine due to covid-19, mentioned by teachers and students, also differ, for the most part. While teachers indicated setbacks more associated with social, pedagogical, and technical aspects (Figure 5), students pointed out problems and difficulties more related to personal and technical issues (Figure 6).
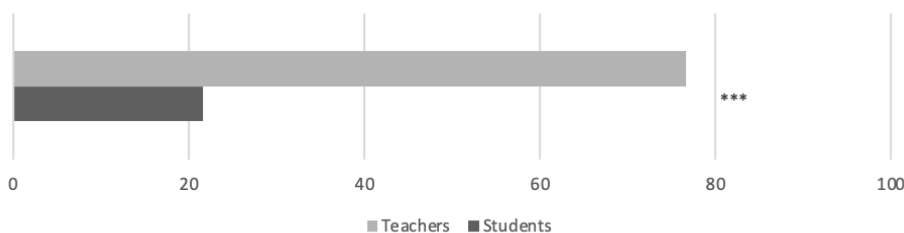
Figure 4 – Percentage of students and teachers who stated that the situation resulting from the quarantine due to covid-19 caused other problems and/or difficulties in the use of digital platforms and technologies.
*** $p < 0.001$.
Source: Elaborated by the authors.

Chart 6 – Average difference of the statement that the situation resulting from the quarantine due to covid-19 generated other problems and/or difficulties in the use of digital platforms and technologies, for students and teachers.

Respondents	N	M	SD	t(gl)
Students	97	1.78	0.414	**7.19 (138)***
Teachers	43	1.23	0.427	

N = number of respondents; M = mean; SD = standard deviation; t = Student's t-test; *** $p < 0.001$.
Source: Elaborated by the authors.

The two main difficulties pointed out by teachers — accentuating inequality between students and students' access to digital technologies — are correlated and are referred to as two of the central problems associated with remote teaching during the pandemic in several studies (Honorato and Marcelino, 2020; Limeira, Batista, and Bezerra, 2020; Ludovico *et al.*, 2020; Rondini *et al.*, 2020; Silva and Teixeira, 2020; Coppi *et al.*, 2022). According to Silva and Teixeira (2020, p. 70076, our translation), "[…] the use of the internet has been revealed to be centralized, and, thus, those who do not have access, but have limited access, or even those who do not have such effective usability are on the sidelines.". Honorato and Marcelino (2020) reinforce the above, claiming that the economic situation of some students makes access to DPT impossible.
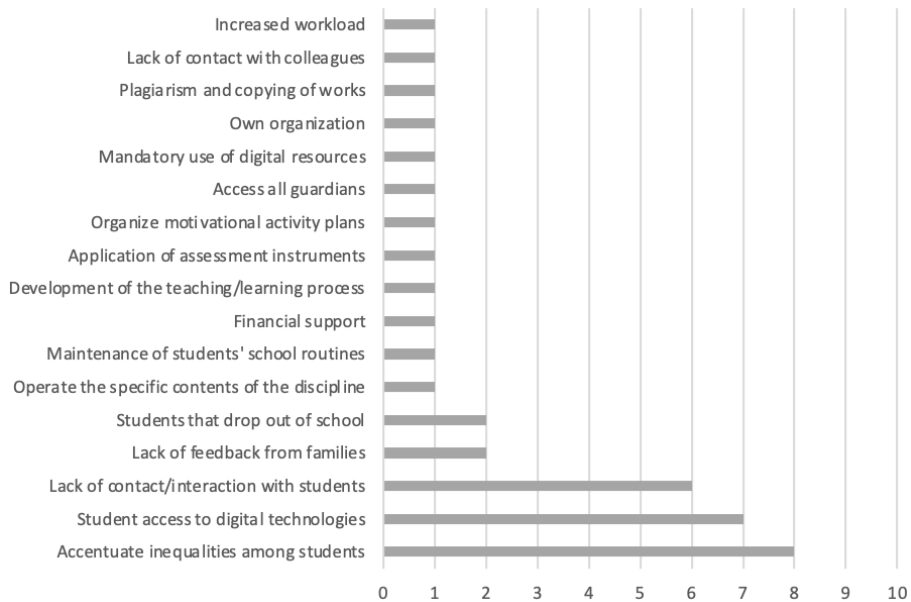
Figure 5 – Frequency of teachers who pointed out other problems and difficulties in the use of digital platforms and technologies, resulting from the quarantine due to covid-19.
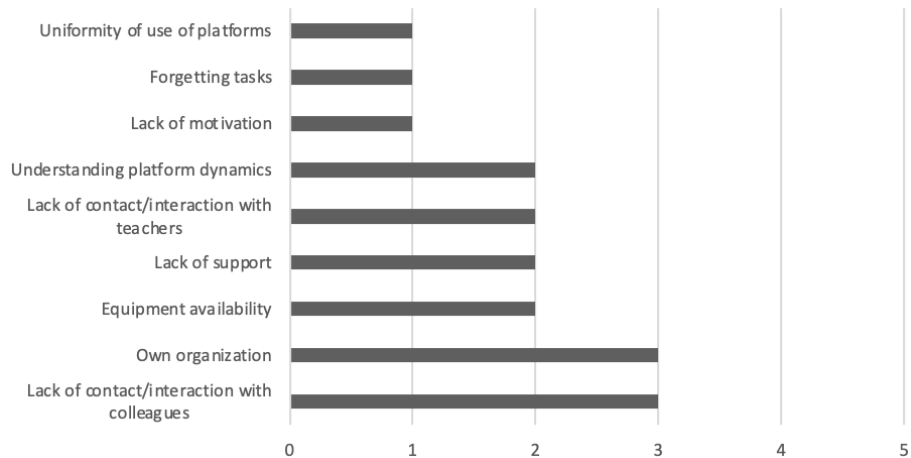Source: Elaborated by the authors.

Figure 6 – Frequency of students who pointed out other problems and difficulties in the use of digital platforms and technologies, resulting from the quarantine due to covid-19.
Source: Elaborated by the authors.

According to the National Institute of Statistics (INE, 2019), in 2019, 89.9% of Portuguese households had internet access at home, with greater access for families with children up to 15 years old (94.5%) (*ibidem*). However, it is worth mentioning that, as stated by Silva and Ribeirinha (2020, p. 199, our translation), although the percentage is high, the 5.5% of the remaining families, who do not

have access to the internet at home, "[…] represent around 50,000 students in digital exclusion.".

In the case of interaction with students, a study by the National Federation of Teachers (FENPROF, 2020) revealed that, by mid-May of 2020, that is, in the middle of the third academic period, more than half of the teachers surveyed (54.8%) had not been able to establish contact with all of its students through remote teaching.

In the case of students, the two main difficulties pointed out refer to the lack of contact and interaction with colleagues and the organization itself. Such difficulties reinforce those reported by Magalhães *et al.* (2020), who identified that, regarding routine change, students revealed a difficult adaptation to the lack of contact with their peers and with teachers. Valasques and Santos (2020) found emotional stress due to social distancing as one of the ways in which the pandemic affected students' lives. They also found that, for many of them, "[…] e-learning modalities are uninteresting and generate a general lack of motivation […]" (Valasques and Santos, 2020, p. 72, our translation). According to the authors, the lack of interest and motivation are due to factors such as the stress that online sessions imply and the difficulties in following classes, answering online tasks, and answering questions (*ibidem*).

FINAL CONSIDERATIONS

Considering the mentioned, the present study showed that, in general, the teachers and students surveyed agree with the advantages and contributions referenced in the questionnaires regarding the use of DPT in their daily school activities. However, it was observed that the average frequency of use of DPT by teachers showed twice as many correlations with the advantages and contributions in relation to that of students, indicating that teachers use them more frequently as the agreement with their potential use is greater.

Regarding the problems and difficulties in using the DPT, the results showed that, while the teachers indicated that the greatest adversities are related to the obsolescence of the computer park, the lack of equipment and the difficulty in accessing the internet, the students identified as the biggest problem just this last category. It is noteworthy that, in general, neither of the two groups of respondents indicated difficulties with the use of IT and with the functioning of digital platforms as obstacles to the use of DPT.

However, when analyzing the correlation between the average frequency of use of DPT and the problems and difficulties of its use, it was observed that teachers use them less frequently depending on the higher level of agreement regarding the difficulties of their use and the lack of knowledge as a user. In the case of students, the use of DPT was lower, while the agreement that the obsolescence of the computer park is a problem is higher.

About the situation arising from the quarantine due to covid-19, 76.7% of teachers and 21.6% of students responded that it generated other problems

and difficulties regarding the use of DPT during remote teaching. For teachers, the setbacks were more associated with social, pedagogical, and technical aspects, highlighting the increase in inequality among students, difficulties in accessing digital technologies and the lack of contact and interaction with students. As for the students, the adversities were more related to personal and technical issues, emphasizing the lack of contact and interaction with colleagues and their organizational capacity.

The results of this study reveal the lack and insufficiency of computer equipment and internet access in schools, reinforcing the importance of its renovation and the need for teacher training to use DPT in their school routine. In addition, the scenario during the quarantine situation due to covid-19 intensified the problems of internet access, inside and outside schools, and portrays a digital exclusion of a portion of the population, in a society marked by digitalization, resulting in a great difficulty for education in the face of remote teaching resulting from the pandemic.

The study carried out showed the limitation of the absence of analyzes of the advantages and contributions and of the problems and difficulties in the use of each of the DPT individually, which were carried out based on the average of the general frequency of its use. This fact was due to the format of the questionnaire items, which made such analyzes impossible. It is suggested, therefore, that future research be structured in order to analyze the potentialities and difficulties of using DPT individually by teachers and students.

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