

# The use of Digital Educational Resources in the Process of Teaching and Learning in Pandemic by COVID-19

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## ABSTRACT

The Coronavirus advance is forcing schools and universities to revise their teaching methodologies. With the closure of the institutions, thousands of teachers and millions of students will have to find new ways of teaching and learning overnight, which will be a huge challenge. We cannot expect everyone to suddenly adapt to these new times. We are aware of the numerous Internet connection problems, but it is a great time to reinvent ourselves and build the courage to test the use of technological tools already available to structure alternatives in the distance education format. Thinking outside the box can help mitigate the momentary problem, as well as collaborate to strengthen digital culture and move towards a new education. The good news is that many teachers have been putting aside prejudices and are being resilient, seeking to understand the potential of available resources, not shying away from seeking and implementing technological solutions that before the virus were seen as secondary and have now become standard tools to teach synchronous and asynchronous classes, share content, correct assignments, answer questions and exchange knowledge. In the beginning, many activities that were previously carried out exclusively in person took a longer time when they started to be performed online. But as the virtual became the new real, students became more engaged and plunged headlong into relevant online learning experiences. Through applications and software, classes continued according to the school calendar. This study aimed to understand how teachers adapted to digital resources to face the limitations caused by the pandemic. It also intends to understand the impact of digital resources on the quality of teaching, as well as on motivation and academic success.

## CCS CONCEPTS

• **Social and professional topics;**

## KEYWORDS

Technology, Educational process, Education, Teachers, COVID-19, Digital resources

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## 1 INTRODUCTION

The Covid-19 pandemic has brought immense challenges for all sectors, in Portugal and worldwide. In an attempt to reduce the widespread spread of the new Coronavirus, measures of social detachment have been adopted by countries, and it is not yet known exactly when they will no longer be needed. In Education, such measures mean, in general, the closure of public and private schools, with interruption of face-to-face classes. There are already 91% of all students in the world who are temporarily out of school due to Covid-19 [5, 8, 17, 20–25]. Portugal has followed the world trend. Throughout the national territory, public and private networks have interrupted the functioning of schools and, among other actions, have been considering transferring classes and other educational activities to distance formats.

Given this context, the present effort seeks to use existing data and evidence to illuminate the challenges and limitations of remote education and, also, the strategies that are most appropriate when choosing to use this alternative. The propositional approach that is characterized here is part of an important premise: in the face of an unprecedented scenario that has required public educational authorities to make quick decisions on unprecedented and highly complex issues, analytical productions gain greater adherence and usefulness as they recognize the moment of exceptionality. In this

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line, we try to avoid, for example, a “cold” reading of research on distance learning, which, in general, focuses on comparing “distance classes” with “face-to-face classes” (while, in the current scenario, question is, fundamentally, a discussion between “distance classes” and “not taking classes”) [6–10]. In a similar sense, the experiences of countries that interrupted the functioning of schools for long periods due to situations of war, refugee crises, natural disasters and epidemics show that the choice of the public power to do nothing, under the argument that it is not possible reaching everyone, tends to exacerbate the inequalities resulting from the emergency situation [11–14].

In the current context of the provisional closure of schools, in which students will be without face-to-face classes, there is great concern about a possible complete paralysis of the teaching-learning process and the reduction of stimuli that seek the cognitive and socioemotional development of students. In this case, strategies that encourage and support distance activities become essential to reduce the potential effects of the crisis on Education [2, 17, 21]. Therefore, when analyzing the relevance of distance learning strategies in an unprecedented scenario of massive closure of schools, it is crucial to bear in mind that the analysis must have this fact (that is, the absence of classes) as an important parameter of comparison. Even so, the most recent research shows that it is not an equivalent alternative: remote activities, and even more structured activities in the Distance Education modality, have their limitations and, in effect, will not be able to replace the classroom experience, in particular, when applied in scale in Basic Education. Evidence-based literature shows that students who have activities entirely at a distance learn less than those with classroom experience in schools, even taking into account other factors that could affect academic performance [11–15].

And, even when teaching is not entirely distance learning, the evidence is still mixed as to the effects of educational technologies on student learning, in addition to pointing out that many tend to be low cost-effective. Thus, it is necessary to have realistic expectations regarding the various existing solutions, knowing that they are important alternatives at the moment [5, 10, 15].

Although there are promising educational technologies, their positive results come when they are used in conjunction with face-to-face school activities, which involve student interaction with teachers, tutors and each other (that is, not entirely virtual). In addition, the rapid and complex change that the current scenario requires makes the task even more challenging [16–19]. Difficulties in adapting to the remote education model are natural and should occur even more accentuated in Portugal, since the consistent use of technologies still has a very timid presence in the education networks. Examples of existing obstacles are the lack of knowledge about the quality of most of the available solutions, the little familiarity of students and professionals with distance learning tools and the lack of a family environment that supports and promotes online learning. Thus, it is very likely that, when the period of social detachment ends, students will have significant learning gaps (among other issues).

Currently, there is already a wide range of technologies that can be used in remote education. As a reaction to the crisis caused by the new Coronavirus pandemic, national, international organizations and multilateral organizations have even carried out studies and

indicated technological solutions and resources for education networks, schools, teachers and families, aiming, at this moment of social distance, to support the students' learning process [6, 8, 15, 19].

However, it is essential to understand that there are several approaches to distance learning, and that not all are equally effective.

As evidenced by the Learning Sciences evidence, educational technology should not be limited to online class platforms, with slides available, teachers being filmed and exercises to be done. Diversifying learning experiences remains essential and, for this, games, visits to virtual museums, simulations, use of remote laboratories and a series of other resources currently available can be used.<sup>28</sup> In addition, pedagogical strategies already recognized as effective in teaching in person can also be used remotely, such as classes that promote the resolution of more complex problems, research and the collaborative construction of knowledge [3–5, 10, 12].

It is also important to remember that certain contents and subjects are better adapted to virtual teaching than others, so it may be important to analyze, in the curriculum, which competences and skills can be better worked at a distance, so that they are the focus of pedagogical activities in this period of school closure.

In addition to the academic contribution that distance activities can bring at times like this, the experience of countries that have gone through similar crises suggests that there are other important gains when they are organized and worked with consistency. Among them, the contribution that such activities can have to make the home environment more secure and stable stands out, thus rescuing some sense of normality and hope for children, young people and their families, especially those in situations of greater vulnerability [1–4].

Finally, research already shows that the involvement of families in the education of children and young people is essential for their school performance. Issues such as having high expectations about learning, communicating frequently about pedagogical activities and encouraging study and reading habits are some of the main elements indicated by the literature. Undoubtedly, such habits should be further stimulated by public policy in view of the current situation, taking advantage of the fact that students are in direct and frequent contact with their families [1, 2, 5, 9].

In addition, with the crisis, an important opportunity opens up: investing in strengthening the family-school relationship now can bring gains not only in the short term, but, fundamentally, when the classroom dynamics of classes are reestablished. If supported by networks and schools in the post-crisis, it will be a crucial aspect for the return to school phase and, in the medium-long term, highly beneficial for Education more generally.

## 2 METHOD

The present study aimed to analyze all teachers (regardless of the school context) and aims to understand the adaptability of teachers in the pandemic by COVID-19: to develop a diagnostic assessment on how teachers use Digital Educational Resources in the classroom Portuguese public education before and during the pandemic.

	N	%
<b>Gender</b>		
Female	152	69.4
Male	67	30.6
<b>Age</b>		
25 a 30 years	4	1.8
31 a 40 years	43	19.6
41 a 50 years	87	39.7
51 a 60 years	64	29.2
61 years or older	21	9.6
<b>Education Level</b>		
Postgraduate studies	27	12.3
Graduation	56	25.6
Master's degree	66	30.1
Doctorate (PHD)	70	32
<b>Level of education you teach</b>		
Pre-school education	7	3.2
1st Cycle of Basic Education	17	7.8
2nd Cycle of Basic Education	33	15.1
3rd Cycle of Basic Education	30	13.7
Special Education	13	5.9
Professional Education	6	2.7
High School	32	37
University Education	81	3.2
<b>Locality</b>		
North	52	23.7
Center	82	37.4
Lisbon and Vale do Tejo	49	22.4
Alentejo	19	8.7
Algarve	15	6.8
Archipelagos Azores e	2	0.9
Madeira		
<b>Professional experience</b>		
Less than 5 years	16	7.3
5 to 10 years	23	10.5
11 to 15 years	18	8.2
16 to 20 years	40	18.2
21 to 30 years	67	30.6
More than 30 years	55	25.1
<b>Professional Situation</b>		
Hired	32	14.6
CTFP forward	25	11.4
CTFP indefinitely	57	26
Professionalized	10	4.6
Grouping school	89	40.6
Pedagogical group	6	2.7

Figure 1: Sample (percentages)

	N	%
<b>Do you have a computer / laptop?</b>		
Yes	219	100
No	-	
<b>Did you receive training in technology?</b>		
Yes	99	45.2
No	120	54.8
<b>Is there a computer in all classrooms?</b>		
Yes	166	75.8
No	53	24.2
<b>Is there a computer in the computer rooms?</b>		
Yes	199	90.9
No	20	9.1
<b>Is there internet in all rooms?</b>		
Yes	187	85.4
No	32	14.6

Figure 2: Technological Resources (percentages)

## 2.1 Objective

This study aimed to understand how teachers adapted to digital resources to face the limitations caused by the pandemic. It also allows analyzing which digital resources are most used and how teachers have had to adapt to them.

It also aims to understand the impact of digital resources on the quality of teaching, as well as on school motivation and performance. Other factors such as school integration, difficulties in the management of digital resources and the dedication / effectiveness relationship are also studied.

## 2.2 Results

The evaluation protocol includes a presentation sheet with the objectives and conditions for participation (anonymity, confidentiality and voluntary participation). The questionnaire itself consists of sociodemographic questions as well as questions related to the technological resources that each respondent has (e.g., hardware; software); technological training that the respondent has; resources used for educational purposes; the use of technological resources; impact of digital resources on the quality of school performance.

**2.2.1 Sample.** The sample (see Figure 1) consists mainly of female teachers (N = 152; 69.4%). Among the most prevalent age group there is the participation of teachers aged between 41 and 50 years (N = 87; 39.7%) and 51 to 60 years of age (N = 64; 29.2%), mostly with academic qualifications at PhD level (N = 70; 32%).

Regarding the educational context in which they teach, 3.2% (N = 7) are teachers in pre-school education, 15.1% (N = 30) are teachers of the 2nd Cycle of Basic Education, 5.9% are in special education (N = 13), 2.7% are from vocational education (N = 6), 37% are from secondary education (N = 32) and 30.2% are from higher education (N = 81). The sample consists mainly of Higher Education Teachers.

The majority of the sample resides in the center of the country (N = 82; 37.4%), 23.7% resides in the north (N = 52), 22.4% resides in Lisbon and Vale do Tejo (N = 49), 8.7% resides in the Alentejo (N =

<b>Fóruns?</b>	Yes	70	32
	No	149	68
<b>Themed blogs?</b>	Yes	89	40.6
	No	130	59.4
<b>Websites?</b>	Yes	107	48.9
	No	112	51.1
<b>Digital Portfolio?</b>	Yes	77	35.2
	No	142	64.8
<b>Playing videos?</b>	Yes	127	58
	No	92	42
<b>Moodle?</b>	Yes	78	35.6
	No	141	64.4
<b>Guided sharing on the internet (WebQuest?)?</b>	Yes	51	23.3
	No	168	76.7
<b>Google Docs</b>	Yes	100	45.7
	No	119	54.3
<b>Mp3 or áudio</b>	Yes	76	34.7
	No	143	65.3
<b>Web Conference</b>	Yes	56	25.6
	No	163	74.4
<b>Repository of digital educational resources?</b>	Yes	127	58
	No	92	42
<b>Social Media (Facebook, LinkedIn, ...)</b>	Yes	127	58
	No	92	42

Figure 3: Before the pandemic - what technological resources did teachers use? (percentages)

19), 6.8% live in the Algarve (N = 15), 0.9% live in the archipelagos (N = 2).

	N	%
<b>Multimedia Presentations (Prezi, PPT, ...)?</b>		
Yes	203	92.7
No	16	7.3
<b>Multimedia (DVD; CD-ROM; ...)</b>		
Yes	171	78.1
No	48	21.9
<b>Email</b>		
Yes	211	96.3
No	8	3.7
<b>Messenger</b>		
Yes	114	52.1
No	105	47.9
<b>Fóruns?</b>		
Yes	147	67.1
No	72	32.9
<b>Themed blogs?</b>		
Yes	105	47.9
No	114	52.1
<b>Websites?</b>		
Yes	131	59.8
No	88	40.2
<b>Digital Portfolio?</b>		
Yes	95	43.4
No	124	56.6
<b>Playing videos?</b>		
Yes	138	63
No	81	37
<b>Moodle?</b>		
Yes	136	62.1
No	83	37.9
<b>Guided sharing on the internet (WebQuest?)?</b>		
Yes	102	46.6
No	117	53.4
<b>Google Docs</b>		
Yes	162	74
No	57	26
<b>Mp3 or audio</b>		
Yes	104	47.5
No	115	52.5
<b>Web Conference</b>		
Yes	210	95.9
No	9	4.1
<b>Repository of digital educational resources?</b>		
Yes	155	70.8
No	64	29.2
<b>Social Media (Facebook, LinkedIn, ...)</b>		
Yes	110	50.2
No	109	49.8

Figure 4: During the pandemic - what technological resources did teachers use? (percentages)

	N	%
<b>Did the school make the resources available?</b>		
Yes	123	56.2
No	96	43.8
<b>Did the school encourage use?</b>		
Yes	209	95.4
No	10	4.6
<b>Lack of skill in using technology?</b>		
Yes	45	20.5
No	174	79.5
<b>Lack of time in preparing classes?</b>		
Yes	84	38.4
No	135	61.6
<b>I am not aware of the features?</b>		
Yes	26	11.9
No	193	88.1

Figure 5: Difficulties experienced in the use of digital resources (percentages)

Most teachers are active between 21 to 30 years of service ( $N = 67$ ; 30.6%) and more than 30 years of service (55; 25.1%). The vast majority are effective at work ( $N = 89$ ; 40.6%).

**2.2.2 Technological Resources.** With regard to the technological resources (see Figure 2) that teachers could access during the pandemic by COVID-19, it was found that all teachers have access to a fixed computer per teacher ( $N = 219$ ; 100%). The vast majority did not have specific training in the area of technology ( $N = 120$ ; 54.8%). The rooms have a computer ( $N = 166$ ; 75.8%) and there is an internet connection in practically all rooms ( $N = 187$ ; 85.4%).

**2.2.3 Before the pandemic - what did technological resources teachers use.** It was intended to analyze the technological resources used by teachers before the pandemic (see Figure 3). It was found that teachers used multimedia presentations (for example, Prezi) ( $N = 206$ ; 94.1), resort to multimedia ( $N = 168$ ; 76.7%), Email ( $N = 171$ ; 78.1%), Video playback ( $N = 127$ ; 58%), digital educational resources ( $N = 127$ ; 58%) and social networks (for example, Facebook) ( $N = 127$ ; 58%). They did not use Messenger ( $N = 166$ ; 75.8%), forums ( $N = 149$ ; 68%), blogs ( $N = 130$ ; 59.4%), thematic websites ( $N = 112$ ; 51.1%), digital portfolio ( $N = 142$ ; 64.8%), Moodle ( $N = 141$ ; 64.4%), Google docs ( $N = 119$ ; 54.3%), MP3 ( $N = 143$ ; 65.3%), WEB conference ( $N = 163$ ; 74.4%).

**2.2.4 During the pandemic - what technological resources did teachers use.** It was intended to analyze the technological resources used by teachers during the pandemic (see Figure 4). During the pandemic it was found that teachers used almost all digital resources, even those that before the pandemic did not use, with the exception of thematic blogs ( $N = 114$ ; 52.1%), digital portfolio ( $N = 124$ ; 56.6%), MP3 ( $N = 115$ ; 52.5%).

**2.2.5 Difficulties experienced in the use of digital resources.** It was intended to analyze the technological resources used by teachers during the pandemic (see Figure 5). During the pandemic it was

		N	%
Attention	Yes	168	76.8
	No	51	23.2
Learning	Yes	170	77.6
	No	49	22.4
School motivation	Yes	171	78.1
	No	48	21.9
Student / Teacher Interaction	Yes	145	66.2
	No	74	33.8
School success	Yes	182	83.1
	No	37	16.9
School integration	Yes	46	21
	No	173	79
Decrease in deviant behaviors	Yes	125	57.1
	No	94	42.9

Figure 6: Impact of the use of digital resources (percentages)

		N	%
Classes's preparation	Difficult	93	42.4
	Easy	126	57.6
Classes's application	Difficult	64	29.8
	Easy	155	70.2

Figure 7: What is the level of difficulty in using the classes (percentages)

found that teachers used almost all digital resources, even those that before the pandemic did not use, with the exception of thematic blogs (N = 114; 52.1%), digital portfolio (N = 124; 56.6%), MP3 (N = 115; 52.5%).

**2.2.6 Impact of the use of digital resources.** The use of digital resources in online classes, during the pandemic, allowed students to improve their attention (N = 168; 76.8%), improved learning (N = 170; 77.6%), increased school motivation (N = 171; 78.1%), improved the relationship between student and teacher (N = 145; 66.2%), increased school performance (N = 182; 83.1%), and decreased deviant behaviors (N = 125; 57.1%). It was also found that school integration was impaired (N = 173; 79%) (see Figure 6).

**2.2.7 What is the level of difficulty in using the classes.** Teachers do not seem to have had difficulties in preparing online classes (57.6%) or in applying digital resources in distance learning during the pandemic (70.2%) (Figure 7).

### 3 CONCLUSIONS

This study aimed to understand how teachers adapted to digital resources to face the limitations caused by the pandemic. It also intends to understand the impact of digital resources on the quality of teaching, as well as on motivation and academic success.

With this in mind, and when observed together, the messages presented point to the understanding that, at this moment, the best use of distance learning is that which is guided by a strategy that recognizes the existing risks, having a close look at the equity and that, fundamentally, supports teachers to go ahead of the teaching-learning process. Even so, the position recorded in the first message of this document is reiterated: given the context, however consistent the adopted strategy may be, it can, at best, minimize negative impacts. Therefore, only a good planning and execution of the return to school, which recognizes the multiple dimensions that will need to be addressed, will be able to adequately respond to the challenge imposed.

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