Teachers' adaptation to technologies during the pandemic by COVID-19

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ABSTRACT

This crisis that our society faced, due to the pandemic COVID-19, had implications not only in the social relationship of human beings, but also in terms of the School and families with school children and young people. From the outset, the School had to quickly devise an intervention plan that would prove effective with regard to the learning of its students. On the other hand, families also had to replan their lives so that, at home, they could collaborate with the School in supporting children and young people in dealing with everything that was asked for them exclusively through Technology. Teachers with less training in the field of Educational Technology, had to, in record time, modify their entire methodological intervention plan with their students, using a wide range of technological instruments, always aiming at learning of these, using technologies, and the use of digital platforms appears more quickly and instantly in a more consistent and permanent way, with a view to responding to the consequences that this pandemic has placed on the school community.The questionnaire was distributed using the Google Forms platform between 14 and 31 May 2020. The representative sample of the study subjects is composed of 536 questionnaires answered and validated, which taking into account the universe of teachers in Portugal, represents an actual assumed error of 4.23%.

CCS CONCEPTS

• **Social and professional topics**;

KEYWORDS

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

ACM Reference Format:
Paulo Afonso, Bruno Trindade, Domingos Santos, Ricardo Pocinho, Paulo Silveira, and Pedro Silva. 2020. Teachers' adaptation to technologies during the pandemic by COVID-19. In *Eighth International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM'20), October 21–23, 2020, Salamanca, Spain.* ACM, New York, NY, USA, 5 pages. https://doi.org/10.1145/3434780.3436590

TEEM'20, October 21–23, 2020, Salamanca, Spain

ACM ISBN 978-1-4503-8850-4/20/10.
https://doi.org/10.1145/3434780.3436590

1 INTRODUCTION

The context of the COVID-19 pandemic [1–3] made the School attempt to respond effectively to the context of confinement in which leaders, teachers, non-teaching staff and students were forced to respect [4].

The option of distance learning has become an inevitability and new challenges have been posed to teachers, so that their training role continues to be a determining factor for students' learning.

Right now, society is committed to responding to the rapid and sudden process of distance learning at the level of basic and secondary education. This change in the teaching process, for the most technological variant, has posed challenges and showed its weaknesses, but aware that it can open a range of potential offers and tools for learning.

In terms of guardianship, the Ministry of Education itself and the Government have put forward a distance-based educational proposal that could reach the largest number of students, granting them access to television programs on the contents of all subjects and years of schooling in the country. 1st to 9th grade of basic education. This initiative was intended to complement the work carried out by schools and their teaching staff, reaching all areas of the country.

At the School level, we believe that teachers needed specific training on the modality of distance learning, either in order to be able to use the technological platforms acquired by some groups, or those with freer access, such as the Digital Class or Google Classroom.

Therefore, there was a considerable period of time in which educational programs on television coexisted and the moments of synchronous and asynchronous relationship between students and their teachers, always at a distance.

We entered a time when there was a need to continue to be the teacher, the most important element in triggering learning, in line with the words of Kalman [5]: "technology can contribute to improving education if its use is contextualized in a refoundation of institutional relationships and the transformation of teaching

practice, educational purposes, pedagogical planting and didactic proposals. The organization of learning activities oriented towards the exchange of ideas, (. . .). No computer that can do that" (p. 214).

After the effective decision of the Ministry of Education to close the Schools, the use of technology was essential, to minimize the damage, it sought to emanate guiding principles and recommendations to follow, providing guidelines for school support and monitoring for students, helping to promote the consolidation of educational content, continuing distance learning, in the context of autonomous work.

The new reality we are experiencing has shown that, after all, the School is, and always will be, a basic institution in any society.

The World, and more specifically the education system, has been facing a dilemma and new challenges since the beginning of the year, as priorities and interests have changed due to the urgency of survival [6] in combating the problems caused by the pandemic.

Confinement amplifies asymmetries and weaknesses existing in the educational system and in society, necessarily causing changes in the educational systems, jeopardizing the educational community as we knew it.

New challenges have arisen for teachers, with an impact on the way curriculum content is constructed and made available, the respective autonomous work of students and the way of communicating this new context has also changed, very much based on communication mediated by the available technological resources.

The current model has encountered great difficulties in meeting expectations and requires careful preparation of the stakeholders, not only for the execution of a set of new tasks, but also to participate as an active member in a continuous process of transformation and innovation in the education system.

The multiplicity of requests for functions, or activities to which teachers have become subject, in which the time factor is a scarce resource and where the model to which we were accustomed cannot meet requests in the time available, it is necessary to find new ways of think and act [7]. Information and Communication Technologies allow changing a whole set of barriers, since they enable new ways of thinking, acting and reacting in real time.

The use of computational means has brought a series of novelties and new ways of doing work, the teaching / learning process is experiencing challenges and opportunities as it has never been seen before, as ICT has become part of any teacher's experience in your day-to-day. The needs for the use of ICTs lead to the teacher's role having a complexity that goes far beyond the traditional transmission of information and the reproduction of knowledge and content. The need for learning and exploring the new form of teaching and taking advantage of its potential has become a priority. As Brown says, in his article "New Learning Environments for 21st Century", we have to learn to teach digital students [8].

Another dilemma faced by teachers has to do with working conditions at home. This theme is of great importance, since one of the contributions in this study is one of the aspects under analysis. From the outset, teachers had to make an assessment of the functional conditions of the technological equipment they had at their disposal. We refer to personal computers, unlimited Internet access, as well as the need to purchase additional equipment, such as webcams or superior quality headphones.

In addition to all this, teachers continued to be people and, as such, had to adapt to sharing spaces and resources with the rest of the family. This aspect, in some cases, would have been a major constraint and would generate some additional stress.

2 METHOD

This study took place during the period of the pandemic COVID-19, applied to teachers, so that we can perceive the connection of technology in the daily professional performance of these teachers.

2.1 Objective

The main objective of this study is to carry out a diagnosis at national level on the use of technology in the educational field, in the period of the pandemic COVID-19, through the application of a questionnaire to teachers.

Additionally, it was intended to perceive the technological resources used by teachers in the context of distance learning, as well as to know whether they had or not adequate training for this purpose.

2.2 Results

2.2.1 Sample. The sample consists mainly of female teachers (N = 373; 69.6%). Among the most prevalent age group, there was the participation of teachers aged between 50 and 59 years (N = 225; 42%) and 40 to 49 years of age (N = 197; 36.8%).

Regarding the educational context in which they teach, 3.5% (N = 19) are teachers in pre-school education, 12.5% (N = 67) are teachers of the 2nd Cycle of Basic Education, 14, 6% (N = 78) are teachers in Higher Education, 19.8% (N = 106) are teachers in the 1st Cycle of Basic Education, 24.1% (N = 129) are teachers in the 3rd Cycle of Basic Education and, finally, 25.5% (N = 137) are secondary school teachers. Secondary and Higher Education teachers are within the sample of the present study.

With regard to the geographical location in which teachers exercise their professional functions, most are professionally integrated in an educational context in the Center of Portugal, including the Central Region and the Lisbon and Vale do Tejo Region (N = 361; 67, 54%).

2.2.2 Technological training of teachers. Regarding the technological training that teachers held before the COVID-19 pandemic (see Figure 1) and which facilitated their functions with distance learning, the technologies (1) Microsoft Office were measured; (2) Internet; (3) Social Networks; (4) Distance Learning; (5) Educational Applets; and (6) Technological Educational Resources.

With regard to technological training in the context of Microsoft Office, it appears that, among those who have this training, the majority of teachers are integrated in the educational context of Secondary Education (63.2%) and the 2nd Cycle of Education Basic (60.6%). Among the teachers who mostly do not have specific training in the area, there are teachers in pre-school (57.9%) and teachers in higher education (54.5%).

In training related to distance learning, only higher education teachers hold the majority (52.6%).

With regard to specific training in the use of the Internet, it appears that it is training that most teachers do not have, regardless of the educational context in which they are inserted. The same is

		Pre-school	1st Cycle	2nt Cycle	3rd Cycle	Secondary Education	Higher Education
Microsoft Office							
	Yes	42,1	57,1	60,6	56,6	63,2	45,5
	No	57,9	42,9	39,4	43,4	36,8	54,5
Internet							
	Yes	26,3	36,5	33,8	28,3	42,3	34,2
	No	73,7	63,5	66,2	71,7	57,7	65,8
Social Network							
	Yes	5,3	13,5	10.8	10,2	14.3	15,8
	No	94,7	86,5	89,2	89,8	85.7	84,2
Online education							
	Yes	10,5	23,3	34,4	22.8	39,7	52,6
	No	89,5	76,7	65,6	77,2	60,3	47,4
Educational Applets							
	Yes	5,3	10,7	12,7	19,8	28	10,7
	No	94,7	89,3	87,3	80,2	72	89,3
Technological educational resources							
	Yes	42,1	40,8	46,9	41,3	49,6	25,3
	No	57,9	59,2	53,1	58,7	50,4	74,7

Figure 1: Technological training held by teachers (percentages)

true of training related to social networks, training of educational applets and technological educational resources.

2.2.3 Resources used for learning purposes. Regarding technological resources (see Figure 2), the ZOOM application is the most used among higher education teachers (97.3%), pre-school teachers (66.7%) and secondary education teachers (42.9 %).

Google Classroom is used predominantly by teachers in the 1st Cycle (71.2%) and 2nd Cycle of Basic Education (67.2%). This technological resource is less used by higher education teachers (93.2%).

Microsoft Teams is mostly used only by Higher Education teachers (85.1%), with the same being true for School Moodle (52.7%). There is no use of other educational platforms as a technological resource.

The use of WhatsApp as an exchange of correspondence between teacher-student is mostly used by teachers in pre-school education (61.1%) and Facebook does not appear to be used.

With regard to editorial platforms, there was no expression of the use of the use of digital classes or of the virtual classroom.

2.2.4 Communication between teachers and students. With regard to the way teachers and students communicate with each other (see Figure 3), the use of (1) email, (2) online teaching and learning, and (3) asynchronous and synchronous communication was verified.

Email is practically used by all participating teachers, regardless of the educational context they are part of, with the highest expression being Higher Education (98.6%). Online teaching and learning processes were also mostly used by teachers, with the exception of Pre-School Education (38.9%). Regarding asynchronous and synchronous communication, this resource was used by teachers in the vast majority of Secondary Education (92.9%) and Higher Education (91.3%) and less used in Pre-School Education (55.6%).

2.2.5 Resources used for learning purposes. Regarding the resources used by the teachers (see Figure 4), the following resources were presented: (1) presentation of resources; (2) students' autonomous work; (3) Google Forms; (4) PowerPoint; (5) Prezi; (6) Videos.

		Pre-school	1st Cycle	2nt Cycle	3rd Cycle	Secondary Education	Higher Education
Zoom							
	Yes	66,7	25	25	28,6	42,9	97,3
	No	33,3	75	75	71,4	57,1	2,7
Google Classroom							
	Yes	22,2	71,2	67,2	64	47,9	6,8
	No	77,8	28,8	32,8	36	51,1	93,2
Microsoft Teams							
	Yes	16,7	15,4	14,1	26,6	36,1	85,1
	No	83,3	84,6	85,9	73,4	63,9	76,8
Moodle							
	Yes	33,3	15,4	15,6	14,5	23,5	52,7
	No	66,7	84,6	84,4	85,5	76,5	47,3
Utilização de outras plataformas							
	Yes	16,7	28,8	37,5	26,6	38,9	37,8
	No	83,3	71,2	62,5	73,4	61,1	62,2
Whatsaap							
	Yes	61,1	51	25	31,5	39,7	34,2
	No	38,9	49	75	68,5	60,3	65,8
Facebook							
	Yes	22,2	19,4	4,7	12,1	13,7	9,7
	No	77,8	80,6	95,3	87,9	86,3	90,3
Classroom Digital editorial platform							
	Yes	-	41,7	34,4	28,2	45,4	1,4
	No	100	58,3	65,6	71,8	54,6	98,6
Virtual Room editorial platform							
	Yes	5,6	27,5	27	24,6	35,9	2,8
	No	94,4	72,5	73	75,4	64,1	97,2
Digital platforms with educational resources							
	Yes	22,2	52	42,9	44,3	53,9	25,4
	No	77,8	48	57,1	55,7	46,1	74,6

Figure 2: Resources used for learning purposes (percentages)

		Pre-school	1st Cycle	2nt Cycle	3rd Cycle	Secondary Education	Higher Education
Email							
	Yes	94,4	90	87,3	93,3	93	98,6
	No	5,6	10	12,7	6,7	7	1,4
Online teaching-learning							
	Yes	38,9	84	90,5	85,7	86,7	93
	No	61,1	16	9,5	14,3	13,3	7
Asynchronous and synchronous communication							
	Yes	55,6	92,9	87,3	90,8	92,9	91,3
	No	44,4	7,1	12,7	9,2	7,1	8,7

Figure 3: Communication between teachers and students (percentages)

The presentation of content was mostly used by teachers in Higher Education (91.3%), Secondary Education (81.9%) and less used by teachers in Pre-School Education (16.7%). The students' autonomous work was used regardless of the educational context.

Google Forms was used mainly in Secondary Education (52.8%) and was not used in Pre-school Education (0%). The same was true of the PowerPoint feature and Prezi. The use of video was also mostly not used by teachers, regardless of the educational context.

		Pre-school	1st Cycle	2nt Cycle	3rd Cycle	Secondary Education	Higher Education
Presentation of contents							
	Yes	16,7	65,3	66,7	74,8	81,9	91,3
	No	83,3	34,7	33,3	25,2	18,1	8,7
Autonomous student work							
	Yes	77,8	95,9	96,8	97,4	99,2	95,7
	No	22,2	4,1	3,2	2,6	0,8	4,3
Google Forms		Yes					
	Yes	-	46,9	46	59	52,8	8,7
	No	100	53,1	54	41	47,2	91,3
Powerpoint							
	Yes	-	5,1	33,3	29,1	48	59,4
	No	100	94,9	66,7	70,9	52	40,6
Prezi							
	Yes	-	-	3,2	4,3	11,8	10,1
	No	100	100	96,8	95,7	88,2	89,9
Vídeos							
	Yes	27,8	54,1	22,6	24,1	37,8	10,1
	No	72,2	45,9	77,4	75,9	62,2	89,9

Figure 4: Resources used for learning purposes (percentages)

		Pre-school	1st Cycle	2nt Cycle	3rd Cycle	Secondary Education	Higher Education
Google Forms							
	Yes	-	28,9	35,5	44,8	49,6	7,2
	No	100	71,1	64,5	55,2	50,4	92,8
Quizizz							
	Yes	-	19,6	27,4	25	21,3	5,8
	No	100	80,4	72,6	75	78,7	94,2
Moodle							
	Yes	-	7,2	9,7	9,5	20,5	69,6
	No	100	92,8	90,3	90,5	79,5	30,4
Oral questions in synchronous sessions							
	Yes	5,6	66	58,1	62,1	60,6	38,8
	No	94,4	34	41,9	37,9	39,4	61,2
I don't use technology to evaluate							
	Yes	72,2	39,2	30,6	33,6	22,8	9
	No	27,8	60,8	69,4	66,4	77,2	91

Figure 5: Evaluation with existing technological resources (percentages)

2.2.6 Evaluation with existing technological resources. According to the study, the teachers evaluated the students with the existing technological resources (see Figure 5), being consulted about: (1) Google Forms; (2) Quizizz; (3) Moodle; (4) Oral questions in synchronous sessions.

It was found that Google Forms and Quizizz were not used as a means of evaluating students. Moodle was used mostly by higher education teachers (69.6%). In turn, oral questions in synchronous sessions were asked predominantly by teachers in the 3rd Cycle of Basic Education (62.1%) and in Secondary Education (60.6%).

Most pre-school teachers reported that they did not use technologies to evaluate students (72.2%).

3 CONCLUSIONS

The present study was carried out in the context of the pandemic by COVID-19 and its main objective was to analyze how teachers adapted to a new educational reality and the resources they had and used to face the new professional challenges in the educational context.

Rethinking the contents and the way of making them reach the students was something that the Teachers had to worry about the programmatic content and made available to the students. Distance school education, regardless of the technological resources used, is a constant challenge with the need for constant adaptations. The use of Information and Communication Technologies allows it to be a very valid option so that the teaching-learning relationship can continue to occur and contribute to development, to be a very valid option so that the teaching-learning relationship can continue to occur and contribute to the development of new ways of thinking, acting and reacting in real time.

A total of 536 teachers participated in the present study, regardless of the educational context in which they are professionally integrated, these being integrated in Pre-school Education, 1st, 2nd and 3rd Cycle of Basic Education, Secondary Education and Higher Education.

Regarding the questions raised, the teachers revealed, in most cases, that they had the technological conditions and resources necessary to carry out distance learning (e.g., tablets, computers); present technological and specific training in various technological tools (Microsoft Office, Internet, among others); and use technological resources for educational purposes. With regard to the evaluation, the professors mostly carry out the evaluation in synchronous oral sessions.

We can see that the teachers met the conditions, from a technological point of view, to embrace this great challenge, which was to provide and / or reinforce learning to their students without being physically with them, in the usual spaces intended for these purposes.

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