

Article

Teachers' beliefs about the role of Digital Educational Resources in their educational practice

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Abstract: Digital Educational Resources (DER) have undergone a rapid evolution and integration into the educational contexts. Teachers play a fundamental role in incorporating technology into their classrooms, so it is important to identify the value that teachers on DER and reflect on the implications for their practice. Through the qualitative methodology the necessary data is obtained with open-response inter-views with teachers. This dataset was analysed and categorised using AQUAD. The results suggest that teachers acknowledge the importance of integrating digital resources into their classrooms, although there was no consensus regarding the appropriate level at which to do so. Further the inter-views revealed that younger teachers tend to use more self-elaborated or selected resources. Teachers noted the benefits of using technology, especially in regard to maintaining student motivation, how-ever they also highlighted a number of extrinsic challenges and limitations. The results indicate there is a relationship between teachers' perceptions and their practice, although this could be improved.

Keywords: ICT; digital competence; innovative education; primary education; early childhood education

1. Introduction

The education system has adapted to digital society [1, 2]. Digital media and new technologies have been introduced in classrooms around the world, leading to teachers introducing and using Digital Educational Resources (DER), making school and DER inseparable [3]. In recent years, many digital educational resources have been introduced into classrooms [4]. These materials are defined as resources designed for educational purposes, published in digital format [5,6], and selected by teachers to fulfil various objectives: transmitting content, mediating the learning experience, provoking encounters, developing student skills, or making assessments [7]. Specifically, ICT is the means of accessing DER [8, 9], through which knowledge is passed on to students. Teachers are responsible for designing the teaching-learning process in which, in addition to transmitting knowledge, they must develop students' skills and competencies through the use of ICT and digital educational resources: they should be employed as a means of transformation, allowing students to actively build knowledge via collaborative, and authentic learning activities that enable exploration [4]. These skills and competencies, essential in society today, are as follow: collaboration, communication, digital literacy, citizenship, problem-solving and critical, creative and productive thinking [10].

Kopcha [11] acknowledges that a significant gap exists between the amount of technology available to teachers and the educational use made of ICT during teaching-learning processes. Gray, Thomas and Lewis [12] show that only half the number of teachers use new technologies in their profession, and they do so primarily for administrative tasks. In addition, when ICT is used in education, it is not adequately implemented, therefore the technology does not improve teaching-learning quality [13]. Technology is seen as a transformative educational resource [14] with the ability to change the educational landscape; yet this shift has still not become a reality [15].

The use of DER in schools is rare, especially at the Early Childhood Education stage [16]. In the early ages, DER are used little, and when used, it is to communicate with families, design the curriculum [17, 18] or develop technological skills, overlooking the potential application of DER to teaching curricular contents [19]. They are more widespread, however, at the Primary Education stage, though DER are then only used to present the contents [20], without any awareness of their value for teachers' professional development [21]. DER facilitates the achievement of objectives and improves the adaptation of contents, processes, quality of teaching [22] and supports learning [23].

Area-Moreira, Hernández-Rivero and Sosa-Alonso [24] distinguish two types of technology integration models for educational purposes: teachers with professional experience, who are regular users and adequately trained on the one hand; and teachers who use traditional resources and introduce technologies sporadically. That is why the educational potential of new technologies has not yet bloomed in educational practice [2]. Teachers still combine them with traditional resources [25], fail to make use of them [21] and are reluctant to integrate ICT and DER into educational practice [26,27].

Teachers play an essential role in integrating digital teaching resources, since they are the ones who take implementation decisions in the classroom [28]. When working with digital resources, teachers are resource designers, they choose to create their own materials and adapt them to their students' characteristics [9]. An educator's role is thus undergoing a shift: rather than representing a knowledge repository who transmits knowledge, an educator must act as a guide and designer of situations and contexts that are conducive to learning [29].

1.1. Technological Pedagogical Content Knowledge

Beliefs can be defined as psychological understandings and ideas that are considered true [30 in 31]. They are related to personal experiences, emotions and intrinsic appraisals [32], thus becoming determinants and indicators of human behaviour, decisions and actions, i.e. attitudes [32 in 33, 34]. Investigating teachers' beliefs or thoughts implies knowing the actions they conduct in their educational practice [35] and especially their direct impact on teaching and learning.

This relationship between beliefs, attitudes and behaviours is more clearly illustrated in the Acceptance of Computer Technology, proposed by Davis, Bagozzi and Warshaw [36]. In this model, the authors advance that teachers' perceptions of the usefulness of technologies and their ease of use leads to certain attitudes that eventually turn into behaviours. The model is supported by an extensive amount of research and studies indicating that teachers' beliefs are a key factor in the incorporation of new technologies and consequently, that of DER into classrooms [e.g. 31, 37, 38].

Mishra and Koehler [39] presented the Technological Pedagogical Content Knowledge (TPACK) model, in which they establish that teachers need to master three types of knowledge in order to introduce new technologies into the classroom effectively. First, they must be sufficiently knowledgeable about the subject in question (Knowledge of Content); they must also master the processes and teaching-learning practices or methods (Pedagogical Knowledge); and finally, they must know how technology can be used (Technological Knowledge). By thus integrating these three types of knowledge, satisfactory results can be achieved by using technologies [40]. Teachers with high TPACK competencies have been shown to be those most in favour of integrating new technologies

into the classroom, establishing in this way a correlative relationship between TPACK and the Technology Adoption Model (TAM), allowing professionals to overcome intrinsic barriers [41].

Blackwell et al. [15] advance how important it is to understand the educational usages given to new technologies to improve teachers' vision and encourage technological integration. Tezci [42] expressed the need to understand, through a qualitative study, the perceptual differences between teachers of different genders and levels of experience. Perception is a personal construction that changes and evolves over time, so it is important to identify its current state. Teachers' beliefs about ICT and DER play a key role in their adoption and integration in the classroom.

The objective of the present study was to identify the importance that teachers of Early Childhood and Primary Education attach to digital resources, both in their perceptions and in their practice. Specifically, the following research questions were raised:

1. How do teachers perceive digital resources in classrooms?
2. What effects on student learning, or factors, do teachers identify regarding DER?
3. What usefulness and role do teachers assign to DER in the educational process?
4. What are teachers' main satisfactions and difficulties regarding the integration of digital resources in their educational practice?

2. Materials and Methods

2.1. Methodology

The present study is based on the analysis of participants' voices [43]. Narrative research [44, 45] was thus used to establish causal relationships and understand social phenomena [46]. This methodology allows the analysis of teachers' reflections and the capturing of details to understand the DER phenomenon under study.

2.2. Participants and context

The participants were a total of 31 teachers (23% men and 77% women) in an Early Childhood and Primary School. The type of sampling used was intentional and for non-probabilistic convenience, in line with the considered inclusion criterion, which only restricted sampling to active Early Childhood or Primary Education teachers. The average age of the interviewees was 46 years (SD 10.99), the youngest being 28 years of age, while the most senior participant was 65 years. Regarding the length of their teaching experience, the minimum was 5 years, the maximum was 39, and the average number of years of experience was 21 years.

The school's classrooms had interactive whiteboards (IWB) as well as classroom computers for students and teachers. In the case of the Early Childhood classrooms, the classroom computer was a touch device to facilitate its use by pupils. The school also disposed of 25 tablets that could be used by the pupils and a computer classroom equipped with more than 24 computers and a projector. The ICT used included the whiteboard (49.20%), computers (38.10), tablets (11.11%) and Smart TV (1.59%). With regard to the frequency of use of DER (computer applications and video viewing recommended by publishers), 52.63% of participants indicated that they made use of these resources on a daily basis, 31.58% made use of it during computer sessions, and 15.79% occasionally.

2.3. Instruments

The data was collected through interviews that were designed and validated by the research team. The interview was composed of two parts: the first centred on the collection of sociodemographic data (age, gender, academic training, experience, educational stage being taught and teaching function); while the second consisted of 4 open-answer interview questions directly related to the research questions raised.

2.4. Procedure

The data collection was carried out in person. The research team contacted the school's management to request the authorisation to conduct the study. Teachers voluntarily accessed and participated in this study. Audio recordings of the interviews were made after having requested the participants' prior permission, guaranteeing their anonymity and in accordance with the ethical standards of the Helsinki Declaration.

These audio recordings were then transcribed into narratives for subsequent processing. To analyse the information obtained, a mixed (inductive-deductive) process was conducted and the research team drew up a draft of the code map based on the reading of the narratives, research issues and the conceptual framework. This configuration subsequently underwent a minor modification based on the adjustments proposed by experts in qualitative education and research. The Analysis Qualitative Data programme was used to analyse the results, allowing the classification of the identified units of meaning, the assigning of the emerging codes and the grouping into four themes.

3. Results

The analysis and presentation of the results were organised according to the different themes that emerged. The presentation of the results is based on the percentage of Absolute Frequency (%AF).

3.1. Theme 1: Teachers' perception of the importance of DER

3.1.1. Importance of DER in the classroom

The first topic identifies the reasons that lead teachers to consider digital resources in educational practice as relevant. The results are shown in Table 1.

Table 1. The importance of DER in the classroom.

Code	AF (%)	M	SD
1.1. Technological society	39.13%	0.58	0.56
1.2. Capture pupils' interest	28.26%	0.42	0.56
1.3. Favour the teaching-learning	19.57%	0.29	0.53
1.4. Variety	8.70%	0.13	0.34
1.5. Facilitate teaching	4.35%	0.06	0.25

The most prevalent code (1.1. Technology society) refers to the significance of introducing DER and ICT into the classroom because they are currently widespread in many fields of everyday life and have a prominent role in society today. It is thus important that schools keep up and prepare pupils for their future inclusion in society:

[W]e live in a highly computerised society. (Participant 4)

The world is full of technology, it is going very fast, there are many developments, so you have to work on it at school not to fall behind. (Participant 11)

Code 1.3. Favour the teaching-learning process by collecting narratives in which participants state that electronic resources facilitate student learning:

[I]n addition to motivating them, they learn better. (Participant 6)

They expand the pupils' mindsets beyond the pencil, rubber and notebook. (Participant 7)

Other narratives illustrated how the educational process is enriched by the contents worked on, as there is a greater variety and pupils develop their capacities more significantly (code 1.4):

[W]e have a huge choice of resources that we don't usually have in the classroom.
There are videos, songs, there are countless things you can do... (Participant 3)
There are many possibilities [...] (Participant 23)

3.1.2. Integrating DER in the classroom

Narratives describing the integration of DER in the classroom were also identified. The codes that emerged are detailed in Table 2.

Table 2. Integration of DER in the classroom

Code	AF (%)	M	SD
2.1. Full integration	17.86%	0.16	0.37
2.2. Mixed integration	35.71%	0.32	0.65
2.3. Complementary integration	28.57%	0.26	0.51
2.4. Integration by group	17.86%	0.16	0.45

Mixed integration (code 2.2.) refers to the realisation of a part of daily activities using DER and ICT, as described in this narrative:

I think they should be combined. Both textbook and digital formats. (Participant 4)
I think that you can alternate. For example, in one exercise we can use the IWB and students participate interactively, and then we can do the same exercise or a similar one in the book [...] (Participant 16)

It is also worth noting the presence of code 2.4., in which the narratives show that the level of integration depends on the age and number of pupils in the group:

It also depends on your group: whether there are many pupils, whether they are aged 2, 3, 4 or 5 years old... (Participant 23)

I wouldn't use DER too much to start with in Early Childhood, even if they play an important role, because children need exploration, manipulation, attention games [...] I think it is more important in Primary school [...] (Participant 24)

Complementary integration (code 2.3.) is defined as the use of these resources as complementary elements with the objective of reinforcing the contents studied rather than to fulfil the objectives of the curriculum:

That it be a complement to the teacher's work. (Participant 14)

Not for everything, but to look for information, to watch documentaries, even to teach, sometimes they learn that way [...] (Participant 21)

3.1.3. Influence of DER on the learning process

The impact of DER integration was also considered to be highly significant for student learning. Table 3 illustrates the codes under which the corresponding described findings were grouped.

Code	AF (%)	M	SD
3.1. Motivates the process	56.36%	1	0.97
3.2. Improves the process	30.90%	0.55	0.68
3.3. Facilitates the process	9.09%	0.16	0.37

Table 3. Influence of DER on the learning process	3.4 Overexcitement	3.64%	0.06	0.25
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In this way, code 3.1. includes the units of meaning that indicate an increase in motivation, attention, participation, among others, as shown in the following narratives:

[I]’ve noticed that the children are more attentive, and they are excited about interacting, going up to the digital whiteboard and doing the interactive exercises, touching the whiteboard and working with it. (Participant 1)

[I]t is very motivating, it motivates them and captures their interest much more, they are in tune [...] (Participant 15)

And, on the other hand, code 3.2. collects the narratives of the participants who told how they could access a greater variety of resources, improving the quality of the educational process:

[P]uts access to knowledge at their fingertips. [...] they have at their disposal elements that they do not find outside the classroom or at home. It's always very positive because it helps to develop their skills and abilities. (Participant 3)

[I]nstead of always receiving direct explanations from the teacher, interventions come in the format of videos, audios... (Participant 4)

Another notable aspect is that electronic resources allow developing different capacities and make learning more meaningful (code 3.3.), so pupils learn better:

[T]hey help students to understand concepts that might not be conveyed by a book or an oral explanation [...] (Participant 19)

[C]hildren interact and then their reasoning is enhanced, what’s more, it also helps to develop their imagination [...] (Participant 20)

Although less frequent, other narratives pointed to unfavourable aspects of DER in the learning process (code 3.4.), making learning difficult:

[I] think that an excess of new technologies can make interest disappear. (Participant 16)

[I]f you use them a lot, they become addicted to them. (Participant 17)

3.2. Theme 2: Purpose of use

Table 4 presents the results regarding the purpose for which DER and ICT are used in the educational process.

Table 4. Purpose of use

Code	AF(%)	M	SD
4.1. Teaching	79.37%	1.61	1.12
4.2. Assement	4.76%	0.10	0.40
4.3. Teaching competences	3.17%	0.06	0.42
4.4. Teacher functions	12.70%	0.26	0.51

With regard to the purpose of use, we identified that the code relating to the purpose of transmitting knowledge to students was the most frequent (4.1. Teaching):

[I] have some videos that I use to teach traffic signs when we study road safety education [...] (Participant 11)

[T]hey had to do a written presentation of an animal. I gave them the questions and they had to search on the Internet what they ate, what they were like, how they are born... (Participant 14)

It is worth noting that the frequency of teacher narrative codes referring to assessment purposes was low (4.2. Assessment):

In the music subject, I use new technologies for the learning and evaluation processes [...] (Participant 16)

I use rhythms and audio for the assessments [...] (Participant 18)

Participants explained how they use electronic resources to develop teaching functions (code 4.4.) such as, among others, communication or the elaboration of resources:

I use them to communicate with parents [...] (Participant 9)

[I]n my personal work, I also use the computer to draw up materials. (Participant 16)

Although less frequently, computer classes (code 4.3.) were also described as one of the elements used to teach basic digital skills to students:

[O]ne day per week we go to the computer workshops and they interact with the computer and all that [...] (Participant 7)

[We] have set up computer sessions so to teach them what the mouse is, the use of the computer [...] (Participant 22)

3.3. Theme 3: Usage satisfaction

This topic refers to the satisfaction that integrating DER into educational practice can bring to teachers. Different reasons for satisfaction arising from the use of DER and ICT were grouped into three codes, shown in Table 5.

Table 5. Usage satisfaction

Code	AF (%)	Media	Desviación típica
5.1. Student motivation	76%	0,61	0,50
5.2. Ease of work	20%	0,16	0,37
5.3. Productivity for the teaching-learning	4%	0,03	0,18

Increases in student motivation (code 5.1.) were a major reason for teacher satisfaction regarding the integration and use of technological resources, since its use enhances pupils' motivations in the educational process:

[I]'m really pleased actually. This resource has a great impact on pupils (Participant 1)

[Y]ou feel satisfaction every day as you witness how children are amazed to see something or do some activities on the whiteboards [...] (Participant 3)

Code 5.2. includes the narratives in which participants describe how DER facilitates their work in designing and developing learning activities:

They are always within reach and that makes it much easier of course. (Participant 5)
I am satisfied about what I told you, because sometimes, if the activity is well presented, it is highly motivating for students and they make the job of teaching much easier. (Participant 11)

3.4. Theme 4: Use dissatisfactions

In addition, in Table 6, we codified the dissatisfactions or difficulties experienced by teachers in coordinating the DER and ICT in their educational practice.

Table 6. Use dissatisfactions

Code	AF (%)	M	SD
6.1. Time	11.11%	0.19	0.60
6.2. Skills	22.22%	0.39	0.99
6.3. Infraestructure	46.30%	0.81	0.75
6.4. Learning problems	11.11%	0.35	0.55

The different reasons for dissatisfaction mainly originated in the infrastructures and connection problems of electronic devices (code 6.3.), which largely hinder the optimal unfolding of teaching:

Okay, there are Internet connection difficulties. I mean, sometimes the connection breaks down a lot and if you don't have internet, obviously nothing works. (Participant 7)

The difficulties are that sometimes it's difficult to get started, or sometimes the contents do not load well, or the internet doesn't work for some reason. (Participant 15)

We also identified dissatisfaction regarding problems with pupils in the teachers' accounts (code 6.4.), indicating disruptive behaviours or limited digital abilities:

[Y]ou have to keep a close eye on them, I mean you have to prepare the classes very well so that the resources are properly used. If they are not well prepared, the children go to webpages they shouldn't go to [...]. (Participant 13)

[A]t first, children do not know how to use the computer, the names of the different components, what a mouse is, what a desktop is [...] (Participant 20)

Code 6.1. Time is also one of the major difficulties mentioned in the narratives, as they regard the time required to prepare and work on the activities that integrate digital resources as a limitation.

[I]t takes a long time to load digital books and all that. I spend more time preparing the online pages than giving my own explanations at the board. (Participant 8)

[I]t is very time-consuming, I spend a lot of time preparing these activities. (Participant 29)

4. Discussion

The results obtained for the first research question showed that according to the participants' narratives, DER has a relevant role in the educational landscape. This data supports the study of Ravasco et al. [47], who found that 91% of professionals gave a positive rating. Nevertheless, teachers sometimes overlook the value of using these resources [21]. Most justifications of the relevance of DER in the classroom coincide with those presented in other studies [9], which emphasise that the technological society we live in makes it necessary to introduce these resources in the classroom, in addition to the fact that they are motivating. In the same way, they improve the teaching process by making it easier to improve the quality of the teaching and to achieve the learning objectives [22,23].

With regard to the perceived integration, worthy of note was the combined use of these resources with traditional resources, a common occurrence in today's educational practice [25]. But it is worth highlighting that teachers' perceptions differed, and no consensus was observed regarding how to properly integrate DER in education [27]. The function of assessment was excluded from the described purposes [20] and their integration could be regarded as depending on the age or number of students.

The second research question concerned the influence detected by teachers of DER on the teaching process. Teachers regarded it as directly related to the importance of integrating these resources into the classroom and the generated benefits, as they highlighted the motivation factor [48] and the capacity of DER to facilitate and improve the process [22,23]. The only negative factor identified was that the use of DER caused some overexcitement. The latter may be due to the fact that in certain circumstances or activities, using ICT and therefore DER can be excessively motivating and overcompetitive; behaviours, however, generally tend to improve [49].

The third research question addressed the use and prominence that teachers assign to digital resources in the teaching-learning process. The results showed that teachers were content creators [9], though we perceived high levels of usage of published book materials [48], mainly by teachers of a more advanced age. Vidal et al. [48] also highlighted the use of applications, but not that of videos or audios. Furthermore, these authors indicated that the main means of accessing DER were the IWB, computers or tablets, thus reflecting the results of our research. Teachers stated that they mainly used ICT and DER on a daily basis [27], primarily for teaching and specific teaching functions, overlooking almost entirely their integration in the assessment process [20,17,18].

In relation to the fourth research question, i.e. the satisfactions and dissatisfactions related to the use of DER and ICT, teachers were satisfied with the motivating factor [9]. Yet dissatisfactions mainly stood out, as teachers more frequently identified infrastructure problems [50]. Few were concerned, however, about their lack of training and skills: this is a major barrier to the integration of digital resources in the classroom, since it is necessary for teachers to master the three types of knowledge proposed by the TPACK model [24,39,50].

The results show that, as mentioned by Vanderlinde, Aesaert and van Braak [51], there may be a relationship between the school and teaching practices. Indeed, we observed a notably generalised use of IWB, together with dissatisfaction concerning the infrastructure, while all participants viewed DER positively. The latter have also been

identified to be directly related to teachers' beliefs [36], although discrepancies do exist between teachers' perceptions, beliefs and the activities they carry out [27]: on the one hand they consider that the DER are important in education, but not all teachers integrate these resources in a significant way in the teaching-learning process.

5. Conclusions

The results show the importance that teachers attach to DER, both in their perceptions and in practice. Integrating these types of resources into the classroom plays a significant role, and so does the coordination and organisation of DER usage in the educational process. It is also noteworthy that teachers identified highly positive factors or effects of DER integration on learning. Indeed, their narratives revealed that DER serve as a good motivation tool.

As for the use that teachers make of digital resources, applications or videos play a notable role. The latter are primarily accessed through the IWB or computers, mainly with the objective of transmitting knowledge. Discrepancies were found between different teachers' degree of use of these resources.

Reasons for satisfaction include the motivating effect of DER on educational development. However, teachers were critical and dissatisfied with respect to the existing infrastructure and resources at their disposal. They were also, in some cases, concerned with a range of learning problems engendered by digital resources, overlooking perhaps the fact that these problems derive from their own lack of skills or training.

The results of this study are not entirely generalisable. The teachers who participated in the study all came from the same school. It would have been interesting to include professionals from different institutions, in order to compare the data and cover a greater variety of participants, in addition to a bigger sample of Early Childhood Education teachers. Moreover, another limitation was the fact that the average age of the volunteers was relatively high, almost half being over 51 years of age. Finally, it is worth noting that the teachers in the sample generally confused the terms "digital resources" and "new technologies".

The present study led us to detect new possible directions of research that could contribute to building knowledge within the educational sciences. First, it would be relevant to reproduce this study using a more extensive sample, i.e. with teachers from different schools and presenting a greater variety of characteristics (educational stage and age). Similarly, a quantitative study would help to clarify how teachers use DER in the classroom, verifying age or gender differences linked to their integration. It would also be interesting to study the reasons why teachers do not significantly integrate DER into educational contexts, especially in their assessment work. A final possible new line of research would be the quest for a digital training strategy adapted to teachers with relatively low digital skills, as teachers indicated that the training provided to them was not meaningful. To summarise, the study met its objective and uncovered teachers' current thinking regarding the use of DER in the classroom. It also provides information on the actual use of these tools and the types of satisfaction and dissatisfaction that may affect their integration in educational contexts.

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