

Primary educational strategies in times of digital curriculum content

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Abstract

Our contribution is based on the most noteworthy results of a research project focusing on teaching strategies at a time when the contents of the primary education curriculum are becoming digital. The expansion of the digital content industry is forcing a paradigm shift. In this paper we analyse the strategies implemented by teachers of the fifth and sixth year of primary school in relation with the digitisation of curricular content. With this aim, we planned our research following ethnographic methodology, analysing a period of two years of a case study. The main data collection tools we used are the analysis of the centre's documents and website, semi-structured interviews with different participants, and direct observation of fifth and sixth year primary education classrooms. We can infer from the analysis that technology facilitates processes of inclusion in the centre, enhancing collaborative and cooperative work. Furthermore, the use of digital devices promotes attention to diversity. The implementation of digital technologies in schools implies redefining teaching practices and teaching-learning processes.

The results show that the addition of digital materials is a step forward in the centre's attention to diversity, improving accessibility and overcoming the digital gap thanks to schools' access to technological resources.

Keywords:

Primary education, ICT, Educational strategies, Curriculum, Inclusive education

I. Introduction: towards a paradigm shift in education

This paper is framed within the research carried out for the project Analysis of teaching strategies on the digitisation of the pre-primary and primary education curriculum (GV/2018/074), a project launched in Resolution 2, of November 2017, of Conselleria de Educació, Investigació, Cultura y Deporte, for the promotion of scientific research, technological development, and innovation in the Valencian Community (Spain).

To delve on the state of the art of the subject matter, we performed a search in different databases and journal publications, as well as other contributions related to primary-school teaching strategies in relation with the digitisation of curricular content and the use of technological resources in educational centres. The search aimed at collecting information on the reality of Information and Communication Technologies (ICTs) in current educational contexts, in relation with primary school teachers, the centres' organisational context, and the use of digital educational materials.

We analysed research related to digital literacy and the use of digital educational materials. In this sense, digital competence requires a specific educational process, since the mere interaction between student and device is not enough to guarantee its development (Mehrvarez et al., 2021; Pérez-Escoda et al., 2016; Pulak, 2018).

The presence of technologies in each and every life situation has changed people's literacy, even its definition (George, 2020; Rodríguez et al., 2018). Literacy is no longer limited to the knowledge and ability to read and write, but also to the ability to select information and solving everyday problems (Arzola et al, 2017; Gibson & Smith, 2018; Southwell, 2013). In addition, Burnett, (2009) y Cuberos y Vivas (2017) contribute to this approach by emphasising that digital literacy requires a critical assessment of the information an individual obtains online, as well as understanding and building a discourse about it.

In addition, the transformation undergone by the field of education is reflected in the transition from traditional materials to online digital teaching resources, which implies profound changes that affect all participants of the school community (Jiménez et al., 2019; Mato-Vázquez & Álvarez-Seoane, 2019; Säljö, 2010; Viñals & Cuenca, 2016), because these tools (digital whiteboards, projectors, computers, mobile devices, tablets, etc.) are designed to revolutionise learning processes, facilitating different learning options and respecting the different rhythms and styles required by each student (Chauhan, 2017; Dix, 2017; INTEF, 2017).

Faced with this paradigm shift, Pérez Gómez (2015) explains that current education must "prepare future citizens to understand and interpret complex political, economic, and cultural environments, navigate uncertainty, develop jobs unknown until now, participate in the collective life of a global and local world in dizzying and permanent change" (p.17). Faced with this perspective, Gómez-Galán (2017) proposes a new educational style, one that must be critical, creative, and innovative, based on media education, favouring the analysis and understanding of technologies, since these are a reference in the current context of comprehensive and holistic education.

As far as teachers are concerned, and in relation with the changes experienced in recent decades, four factors affect primary education teachers' use of digital technologies: school culture, teacher technology, attitudes, and skills (Spiteri & Rundgren, 2020). These factors become relevant because the primary school faculty's use of digital technologies makes the learning process more familiar and closer for today's students (Blau & Shamir-Inbal, 2018; Moreno et al., 2018).

In addition, we want to provide an education to meet the requirements of the current complexity (Morin, 2020) so there is a need to "develop and implement a broad, deep, and

transdisciplinary perspective on digital technology. This must be done from a perspective that contemplates the intertwining artefactual, symbolic, organisational – even biotechnological – elements which make up the educational institutions, and take into account all the research related to the components, influences, factors, and conditions that facilitate (or hinder) learning” (Sancho et al., 2018, p.224).

a. Teaching strategies for dealing with new learning situations

We focus on teachers because their role is changing with the use of technology. Primary education classrooms are filled with interactive whiteboards, videos, presentations, blog creation, collaborative work, digital press, or digital textbooks (Domingo & Marqués, 2013).

As Area (2017, p.18), we assume that we are facing a process of transformation of the teaching job, one that requires:

- a competent teacher who can plan complex learning scenarios (project-based methodology, combination of face-to-face and online teaching, flipped classroom),
- competencies to create and manage virtual learning environments,
- guiding and supervising the students’ individual and group work processes,
- and evaluating the tasks and products generated by the students.

Faced with this reality, we consider it essential to know the opinions of the primary school faculty teaching fifth and sixth year regarding the technological resources they have in the classroom and the teaching strategies they implement.

We want to emphasise four categories in the complex topic that will be our subject of study, analysis, and debate in this text: a) availability of technological resources; b) the implementation of technology in classroom programming; c) teacher training in times of curricular digitisation, and d) the role of digital technologies in inclusion and gender equality.

What technological resources are available in the classroom and in the centre?

Technologies are part of the life of the studied centre. The management team supports the integration of technology into the classroom and promotes continuous training both with the exchange of good practices between colleagues and from external trainers.

They also promote *online work*. With this aim, the centre has a network where they store all the classroom materials, and all the teachers have access to the information.

All classrooms have computers and a whiteboard. There is also a computer classroom. The Basic Vocational Training classroom has computers as well.

From the fifth year of primary school to the fourth year of mandatory secondary education (ESO, in its Spanish initialism), students bring their own devices. At the moment they have Chromebooks, a few years ago they used tablets, and some are already starting to bring a laptop. This makes it easier for students to access the network from any device registered in the centre, and they can work on any subject of the curriculum.

Below, Table 1 details the infrastructures and resources available in the centre.

Internet access	Optic
Internet access for teachers, students and administrative staff	Yes
ICT classroom	17 computers
Computer classroom	9 computers
Number of classrooms in the centre	25
Number of classrooms with Internet access	25
Laptops	6
LCD projectors	20
Interactive Digital board	18
Equipment for students with SEN	3 computers 1 scanner 1 printer
Computers for faculty	4

Table 1. Infrastructures and technological resources in the centre

Source: created by the authors.

How is technology implemented in classroom programming?

The fifth and sixth year primary classrooms have two teachers, so they carry out a *shared teaching* experience. While not specifically digital, this process is one of the new innovative teaching strategies. Their classroom management takes into account the students' initiative, with the twofold purpose of improving their learning and developing autonomous and responsible attitudes (Cabero & Ruiz, 2018).

The teachers interviewed make it clear that, in this centre, discussion and debate are a central part of school activity, thus ensuring the potential development of communicative skills and the joint construction of student knowledge (Mercer & Edwards, 1988; Mercer, 1997).

In their shared tutoring, they plan the teaching task assuming that the complex composition of the classroom will facilitate the construction of complex and divergent thinking (Morin, 1997).

They also value the students' knowledge, experiences, interests, concerns, and desires to involve them in a process through which they can express their vision of reality. And in this sense, carrying out *classroom projects* facilitates the reconstruction of the critical thinking process from students' experiential culture. Teachers try at all times to create a shared knowledge space in the classroom to facilitate the socialisation of learnings through negotiation, dialogue, participation, and decentralisation of knowledge (Hong et al., 2015; Palmgren-Neuvonen et al., 2021; Pérez Gómez, 1998; Reusser & Pauli, 2015).

What do teachers think about their training in the digitisation of curriculum contents?

Teachers emphasise the importance of *peer training* among the faculty. In the interviews, they explain that the training is carried out as needs arise, in order to solve particular problems. Teachers at the centre have been trained in ICT tools such as the use of digital

devices, digital book publishing, and digital licencing for tablets, as well as other methodological aspects. Some of the training sessions were conducted by publishers. In the observations and interviews, we detected the need for further training in didactics and methodology, with or without ICT, to better assist students with special educational needs (Alderete et al., 2017).

What role do ICTs play in gender inclusion and equality?

The centre tries to help any student who needs specific attention to feel welcome. "The tutor of the fifth year of primary" indicates that there is a girl in class who does not control day-to-day tasks, so learning scenarios are organised so that she feels she is part of the group and there are people who can help her. In this centre, difference helps themus to learn, to live in the world.

The teachers interviewed insist that everyone is committed to cooperation and peer learning. They assume that the use of digital technology transforms classroom life because it allows them to implement new teaching strategies and resources that facilitate certain roles by redefining pedagogical work in the classroom (Schön, 1987; Velez, 2017).

Below is a brief description of the *case study* analysed.

The centre is located in the Valencian Community. More specifically, it is a charter school in the outskirts of the city of Valencia. It currently has 360 students from 24 different nationalities. It is a privately owned charter centre and it currently has a pre-primary education line, eight primary education units, a mandatory secondary education line, and a basic vocational training line.

The centre's economic resources are scarce. After analysing the neighbourhood context we can point out that the social environment has a number of difficulties: young people do not have many job opportunities, there is little participation in community life, integration difficulties, high unemployment rate in families, and low or medium-low purchasing level.

The introduction of technologies into the daily classroom life has been a slow process that began two decades ago. The centre has received several mentions, the most important of which are *IncluD-ed*, *Actuaciones educativas de éxito*, *Centro TIC*, *Red de Centros de Calidad de la Comunidad Valenciana*, and *Red de Centros Plurilingües*.

The centre tries to respond to the educational needs derived from this socio-cultural context. We are looking at a school that teaches students from 24 different nationalities and boosts the process of inclusion in both its organisation and its didactic and pedagogical aspects.

II. Methodology

To develop the current research project, we propose the following hypotheses: How does the availability of technological resources change the way teachers work? How does the use of technology affect the organisation of the centre and the management of fifth and sixth year primary classrooms? How does the use of technology change task planning in primary classrooms? What level of autonomy do students acquire in the learning process?

a. Research context and purpose

We are part of an emerging project for the promotion of scientific research, technological development, and innovation in the Valencian Community. The project proposes a total of

four phases with specific objectives. In this paper we present some of the results obtained in Phase III, whose objective is to identify the organisational strategies adopted by educational centres in relation to the access and use of digital curricular content in the fifth and sixth year primary education classrooms (case study). In addition, we try to identify the benefits of inclusive education, respecting diversity and considering gender issues when using digital curricular materials.

We follow the hypothesis that the use of digital technologies in the organisation and management of fifth and sixth year classrooms affects the way teachers perform their tasks, as well as the interaction processes generated in the classroom and the students' learning.

This paper discusses how this problem is addressed in the fifth and sixth year classrooms according to the following objectives:

1. Analysing the strategies implemented by teachers in the fifth and sixth year of primary school in relation with the digitisation of curricular content.
2. Describing primary teachers' perspectives on the digitisation of curriculum contents.
3. Exploring and studying teacher training needs with regard to content digitisation.

From a methodological point of view, the reference project chose a mixed approach, although the results presented in this article are qualitative in nature. Following authors such as Flick (2004), Gibbs (2012), Stake (1998), Taylor & Bogdan (1986) or Yin (2003), the chosen methodology was the *case study*, which we consider to be most suitable to obtain an in-depth vision of the daily reality of the centre. For Stake (1998), the study of documents for data collection follows the same reasoning as an observation or interview.

In-depth interviews were one of the selected data collection tools (Angrosino, 2012). The interview questions were developed among the members of the CRIE research team (Curriculum, Resources, and Educational Institutions, GIUV2013-105). For verification, it underwent a review process with national and international experts.

b. Participants

The interviews were conducted individually with each of the teachers. The audio recordings are approximately 45 to 60 minutes long and were subsequently transcribed literally. To develop the empirical research in this article, we analysed a total of five interviews.

Table 2 characterises participants by gender, professional experience, and noteworthy aspects of their professional profile.

Subject of inquiry	Gender (M:man W:woman)	Professional experience	Noteworthy aspects of their professional profile
Case study	W	Director of the centre. She has been in office for 2 years. She has 11 years experience in management tasks as part of the management team. Therapeutic pedagogy teacher.	She participates in various innovation projects, from the implementation of whiteboards in all classrooms to robotics and 3D design projects. She participates in classroom training and innovation activities. She performs planning and coordination tasks in the relationship between the centre, the neighbourhood, and the students' families.
	M	Teacher for the sixth year of primary education. 25 years as an English language teacher in primary education.	Coordinator of the centre's multilingual group He participates in classroom training and innovation activities.
	W	Teacher and tutor for the fifth year of primary education. She has been part of the primary education faculty for 32 years.	As a teacher, she has experience in all primary years. She has performed management duties as head of studies at the centre. She started the implementation of tablets in primary classrooms in the centre. Design and creation of digital educational materials. Involved in educational innovation movements.
	M	Teacher and tutor for the fifth year of primary education. She has been part of the primary education faculty for 32 years.	As a teacher, he has experience in all primary years. He started the implementation of tablets in primary classrooms in the centre. Design and creation of digital educational materials. He has his own blog.
	M	ICT coordinator and secondary school teacher. He has 38 years experience as a teacher in the centre.	He has experience in educational technology since 1985, when he started working with computers (self-taught). Responsible for the centre's website. He has experience as a secondary education teacher and coordinating the design and creation of digital educational materials.
	M		He coordinates the photo/video production of the centre: collaboration of families, extracurricular outings, student exchange programmes, graduations, etc.

Table 2. Characterisation of participants / Source: created by the authors.

c. Procedures and resources

To analyse the case study in its natural context, we chose the following data collection techniques: school documents, field diary, classroom observations, and interviews. Content analysis is the research technique that has allowed us to analyze the reality of the educational context (Bardin, 2001). Figure 1 details the sources and the analysis process.



Figure 1. Sources and analysis process. Source: created by the authors.

The techniques and instruments specifically designed for the data collection are listed below (Area, Santana y Sanabria, 2020).

- School identification data sheet, with information on the type of center and its location; number of units, students, and teaching and non-teaching staff; the employment status of teachers, their professional experience and time working in the school; and finally, the availability (or not) of an ICT coordinator.
- Digital resources sheet generated by the school: website, blog, the centre’s social media accounts, departments, or subjects.
- Semi-structured interviews for the centre’s management team, ICT coordinators, and teachers who participated in the classroom observation.
 - The interview for the centres’ management teams was organized according to the following dimensions: training and experience of the team, the teachers’ involvement in ICT, and the integration of ICT in the centre.
 - The interview for the ICT coordinator was structured according to the following dimensions: the history of the ICT use in the centre, current use of ICT, role of the ICT coordinator, the ICT Plan, and teacher training.
- Classroom observations with a semi-structured script according to the following factors: the students’ activity, the role of the teacher, the resources used (hardware/software and online/offline) and who uses them, and finally, the organization of the classroom.
- Researcher’s diary, taking into account the centre’s identification details, the descriptions of the sessions, and the evaluations related to the development of information collection.

d. The information analysis process

This text focuses on the analysis of five interviews conducted with the faculty of the case study. Classroom observations, along with interviews, allowed us to identify educational experiences and activities involving the implementation of teaching strategies.

The analysis was performed using matrices to categorize the literal transcriptions of the five interviews. Transcription is considered to be an analysis strategy whose purpose is to evince both explicit and implicit meanings. In this way, the transcription allows us to code “different

elements into categories that demonstrate more clearly the meaning” of the phenomenon subject study (Tójar, 2006, p. 311).

As Rapley (2014) points out, the recordings can allow us to become familiar with what we observe. The transcription process requires repeatedly listening and/or observing and, therefore, can be an arduous, trying, and repetitive task. However, it is during this process that we can begin to grasp the “subtle way in which people interact” (p. 78).

In this work we focus on the opinions expressed by teachers regarding the availability of technological resources, their implementation in classroom programming, teacher training for curricular content digitisation, and the role of ICT in inclusion and gender equality.

The case study report was taken as a reference for organising and processing the data. Regarding teacher strategies, the following categories and aspects are analyzed. Table 3 shows the categories and dimensions that were used for the collection and analysis of classroom observations.

CATEGORIES	DIMENSIONS
1. Availability of technological resources	Introduction of ICT at the centre General assessment / Use of technology in the classroom Programming and digital educational materials in the classroom
2. Implementation of strategies in classroom programming	Usage model Strategy selection criteria Changes in classroom organisation Changes in the role of teachers Development of digital educational content Promoting the creation of materials
3. Teacher training for the digitisation of curricular content	Training needs Teachers’ professional development
4. Role of ICTs in inclusion and gender equality	Inclusion of differently-abled students Development of cooperative groups

Table 3. *Analysis categories and dimensions*

Source: created by the authors.

The final investigation report of this case study gathers the data triangulation obtained through various sources: analysis of school documents, classroom observations, diaries, interviews, transcriptions and protocol.

III. Results

We analyse the results based on the four categories presented in the previous section:

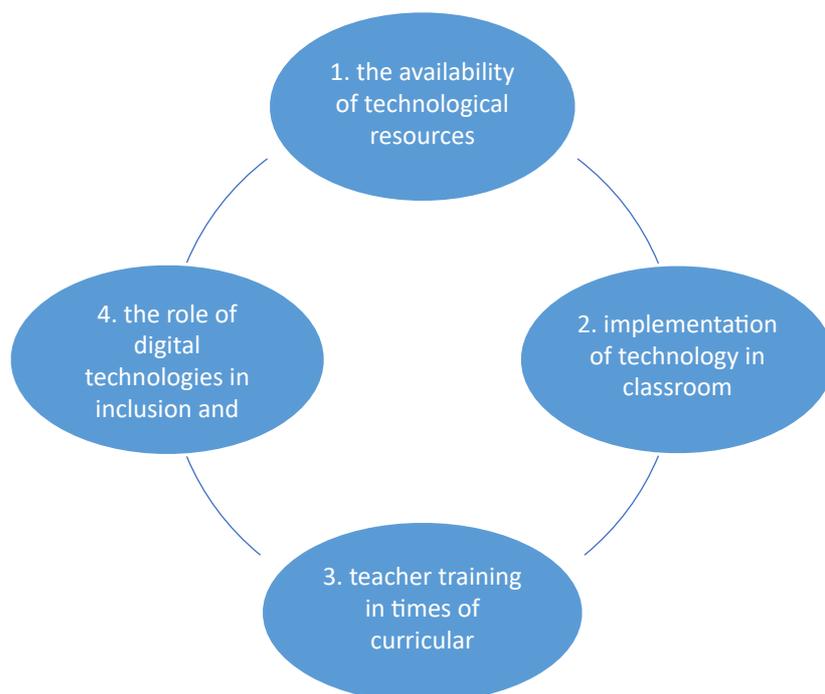


Figure 2. Analysis categories.

a. Availability of technological resources

The centre has a stable and widespread network, which is critical for everything to work as intended. The management team promotes online work. With this aim, they store all the classroom materials in the network and all the teachers have access to the information.

“The centre’s director” states that ICT is an integral part of the centre. The management team supports the integration of technologies, so all classrooms have computers and a whiteboard. There is also a computer classroom. From year five in primary to the fourth year of ESO, students bring their own devices to class. Students are given access to the network from any device registered in the centre, so they can work on any subject.

“The centre’s ICT coordinator” argues that the integration of technology into the centre was carried out gradually and families were involved and accepted the centre’s proposal, which implied the need for them to purchase the devices. Given the socio-economic context of the centre, the collaboration of families was very positive. The centre has regulation on the use of digital devices. There is an ICT plan included in the centre’s educational project, but it is currently under review.

b. Implementation of technology in classroom programming

The interviews conducted with the ICT coordinator and teachers of fifth and sixth year of primary education allowed us to deepen into the analysis of the centre’s organisation and management of technological resources, as well as its use in the classroom.

Regarding the implementation, we should note that all subjects use digital educational materials created by teachers, as well as Internet materials and other published materials.

Families pay for licences at the beginning of the school year, instead of buying textbooks. These licenses allow them to access all the resources necessary for the development of the curriculum of each primary school year. All the material created by the teachers is hosted in Google Classroom, and students can access the contents, tasks, and activities. The centre promotes gamification with different applications and the idea is that students themselves prepare material to post and share. Digital storytelling is an example of such projects. This resource can help develop communication in the classroom using digital technologies (Ginés Pérez et al., 2019).

“The tutor of the sixth year of primary” states that in some subjects the digital educational content is developed using Moodle, with activities, jobs, and exams. These subjects are Religion and Art Education, while IT classes were moved to Google Classroom two years ago. In addition, they use materials from publishers SM, Anaya, and Pearson, through the Bling Learning platform, which works with different publishers.

“The tutors of the fifth year of primary” argue that the biggest difficulties they have encountered while implementing these technologies are time and money. It was costly for all students to get their device and take responsibility for it.

As for strategy-selection criteria, the tutors discussed and agreed on how to present works for the Spanish subject. Related to this, “the tutor for the sixth year” comments that students work on something and they share it directly with the teacher, and the teacher corrects it at the same time, creating an interaction between teachers and students.

The model of technology use focuses on the management of tablets, computers, and Interactive digital board, although to a different degree depending on the availability of the resource in each classroom and each teacher’s own training.

c. Teacher training in times of curricular digitisation

Teachers at the centre have been trained in ICT tools such as the use of digital devices, digital book publishing, and digital tablet licencing, as well as other methodological aspects. Some of the training sessions were conducted by publishers.

In the observations and interviews we carried out, we detected the need for further training in didactics and methodology, with or without ICTs, to better assist students with special educational needs.

Regarding teacher training, “the ICT coordinator” emphasises the importance of peer training among the faculty. He explains that the training is carried out as needs arise, in order to solve particular problems. Likewise, he stresses the fact that everyone is committed to cooperation and peer learning.

All the agents interviewed agree that specific technological training of all the teachers involved – as well as families – is essential before the start of the school year. Such training is carried out through the Training, Innovation, and Educational Resource Centres of the Ministry of Education. They also consider it of the utmost importance to initiate reflection processes about the classroom practices implemented in the centre. The interviews with teachers and the management team lead us to new questions that will allow us to continue to learn and better understand the relationship between education and technology, and contribute to the improvement of teacher training processes and the work of educational centres (Area, Santana y Sanabria, 2020; De Pablos, 2015).

d. The role of digital technologies in inclusion and gender equality

Technology facilitates processes of inclusion in the centre, enhancing collaborative and cooperative work. The use of digital devices promotes an attention to diversity. Game-based learning through the use of ICTs is suitable for certain times and needs. "The centre's ICT coordinator" states that technological tools can be very powerful, but do not preclude the use of other resources. While technology is always with us, present in the life of the centre, we must not forget the traditional part of teaching. He also advocates maintaining the use of printed books for specific tasks, according to the needs of the students.

The tutors of the fifth and sixth year highlight the fact that, given the sociocultural reality of the centre, the impact on inclusion is quite relevant, because its classrooms are complex and diverse. In their own words: "we try to make it so that, should a student need very specific attention, such needs can be met". In the observations, we confirmed that, in this centre, difference is used to learn to be tolerant, to dialogue and live in the world (Van Manen, 2010; Wells, 1999). The tutors of the fifth and sixth years emphasise that the centre has always tried to promote equal opportunities, no one is more important than anyone else. The center project is linked to social transformation, where it also works and includes gender relations (Feu & Abril, 2020). Concerning gender equality, this centre's class work is done with cooperative groups, where they learn to respect each other and learn from each other. They know they can do the same work with a boy or a girl. The tutors of the fifth and sixth years see no gender difference in their classrooms because they actually promote equality with the model they offer students at all times. We agree with Maria Zambrano (2001) that we teach more with how we act than we do with what we say.

IV. Discussion and conclusions

This is a centre whose teachers are committed and have a passion for teaching, technology, and educational innovation. Both at the classroom and the centre level, they have the resources to carry out this innovation. Materials and activities are mostly digitised. They use open source alternatives, Google resources, and free online software. Technology is directly or indirectly present in almost all teaching tasks as reflected in the exposed literature (Area, 2017; Arzola et al., 2017; Cabero & Ruiz, 2018; George, 2020; Jiménez et al., 2019; Mehrvarz et al., 2021; Moreno et al, 2018; Rodríguez et al., 2018; Schön, 1987; Velez, 2017; Pérez-Escoda et al., 2016; Viñals & Cuenca, 2016).

In addition, it highlights the impact on student learning insomuch as there is greater motivation, improved peer communication, cooperation, and increased resource choice and capabilities.

The interviewed teachers in both fifth and sixth year of primary school emphasise that with the use of technologies has changed their teaching role, from being the source of knowledge to a companion in the learning process. They consider digitisation to have a number of beneficial impacts on learning and teaching processes.

As for the development of digital educational materials, teachers explain the importance and need for permanent teacher training to continue implementing more and better digital teaching resources and adapt the contents to the requirements of the school community (Chauhan, 2017; Dix, 2017; INTEF, 2017).

After reflecting on their experience, primary school teachers were able to observe that the organisation of the classroom space has changed since they use technology, because students no longer need as much storage space, they have everything they need on their device.

Teaching strategies have a great impact on students and the relationship among teachers. Everyone appreciates the dynamics proposed in the centre and its classrooms (Gómez-Galán, 2017).

After analysing the results, we can conclude that, since the arrival of technology at the centre, there is better coordination between teachers, as well as a greater variety of resources and opportunities to generate innovative and interdisciplinary activities. In this case, digitisation comes with a number of benefits. However, certain difficulties are also observed. Firstly, it comes at an economic cost (both to the centre and to families). Secondly, it requires teachers to be self-demanding and generate strategies and resources, which requires self-learning.

In this case, technology has facilitated the collaboration between teachers and students. The centre has a long history of innovation and inclusion projects, which translates into an extensive experience with ICT-related projects. Technologies have given teachers the freedom to create their own curricular materials. This has made cooperative work and projects easier. The teaching team agrees with Arnáiz (2005) that "what is truly important is that thoughts and attitudes translate into solidarity, tolerance, and new educational practices that bring with them a new way of approaching the students' plurality and multiculturalism" (p. 43).

The centre values the positive impact in student learning: there is greater motivation, improved peer communication, cooperation, and a more varied choice of resources with more extensive capabilities. The use of digital tools minimises the differences between students. Regarding the impact on gender equality, the centre has always worked on the equal value of each and every student, and working in cooperative groups, students know that they can work on an equal footing with both boys and girls. No gender differences are observed. The communication and relationships among teachers have improved; they are now faster: emails are used, they communicate through a network, etc. But the teachers do require more specific technological training. Teacher training is certainly a key aspect that contributes to professional development, but it is not the only one. Recognition, accompaniment, practical training, and sharing experiences are other aspects that facilitate permanent teacher training. As Torres Santomé argues in the Spanish prologue to Jackson (1991 p.13) argues, "the professional knowledge of teachers is built on the basis of interpretations of the situations in which they are involved in their schools and classrooms and the outcome of the decisions they make".

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