

***Challenges and Potentialities of Using ICT in Initial Teacher Education:
A Comparative Study With Students From Portugal and Spain***

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Abstract

The use of digital technologies in a conscious, critical and creative way is one of the challenges proposed in initial teacher training, since we are witnessing a time of change that requires the preparation of future teachers for the 21st century. This article is part of the IFITIC Project which aims to rethink educational practice with ICT in the initial training of future teachers in order to promote methodological renewal in preschool education and in the 1st and 2nd cycles of basic education. The study involves 111 students, from two Higher Education institutions in the North of Portugal, attending Degree in Basic Education and Professional Masters in teaching. It also involves 40 students from a Spanish College of Education. The aim is to know the thoughts of future teachers, regarding their technical and pedagogical knowledge in the curricular integration of Information and Communication Technologies (ICT). This is a quantitative study whose questionnaire survey included open and closed questions. For the open questions we used the content analysis proposed by Bardin (1977). The results show a) the reasons that promote the integration of technologies in the practices; b) the type of activities performed with students; c) the factors that inhibit the use of technological resources in educational practices. The study concludes that the reality experienced by Portuguese and Spanish future teachers is similar. With this study we hope to contribute to a reflection on initial teacher training.

Keywords: Digital Technologies, Initial Teacher Education, ICT Attitude

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Introduction

We are experiencing a time of social, economic and technological revolution, often referred to as the Knowledge and Digital/ Information Era (Castells, 2002), which has opened new possibilities in education that promote a new teaching professionalism (Nóvoa, 2013 Quadros-Flores & Raposo-Rivas, 2017). In a changing framework, the school assumes an institutional commitment to educate integrating principles of a digital and networked society, manifested in new and different ways of communicating, interacting, reflecting and intervening (Gallego-Arrufat & Raposo-Rivas, 2016), new ways of learning and teaching how to learn (Arends, 1995). The new reality influences the initial teacher education that must respond with renewed methodologies and updated analogical and digital resources, so it imposes new scientific, technical and pedagogical knowledge in initial teacher education, as well as other skills to meet the challenges of today (Quadros-Flores, 2016). In this sense, initial teacher education is currently a space of opportunities for experimentation with renewed practices, which facilitate the responsible use of ICTs in an integrated and critical way, and the development of skills, attitudes and values that are relevant today (Graça, Quadros-Flores & Ramos, 2020).

There are several existing guidelines for the development of educators' digital competence in Europe. One of them is the DigCompEdu Framework (Redecker, 2017), which is oriented towards teacher training policies aimed at the digital proficiency of teachers. With the aim of supporting educational practices based on the active involvement of students in the teaching and learning process, mediated by digital technologies, it is divided into six areas focused on different aspects of educators' professional activities (Figure 1).

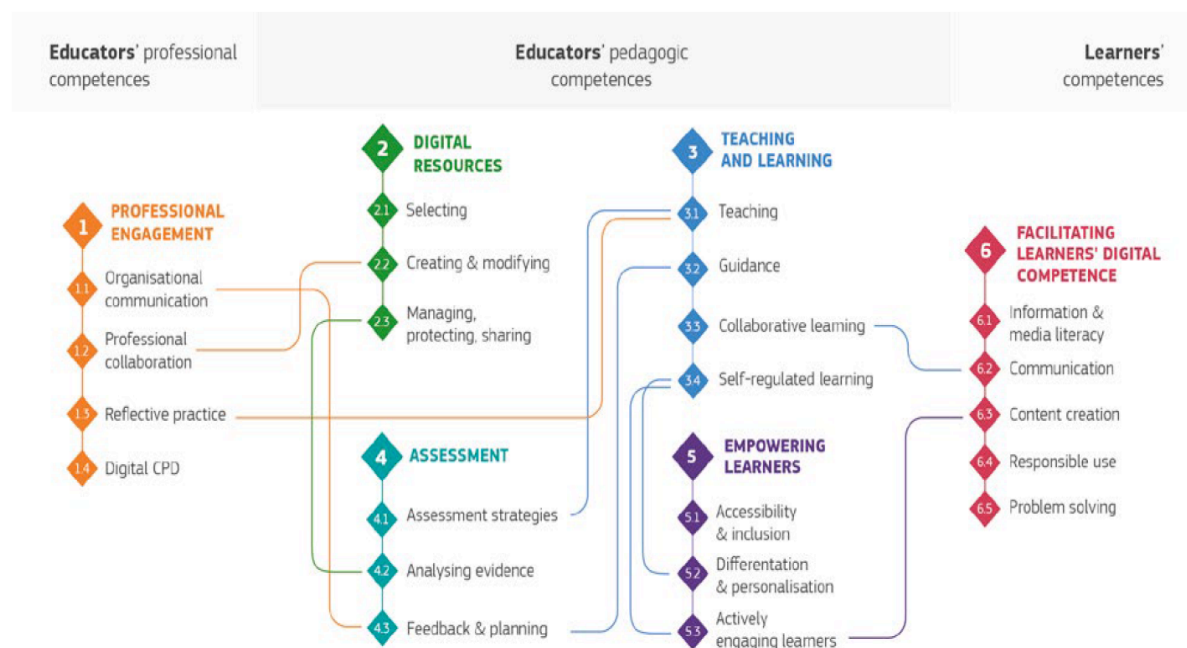


Figure 1: Educators' competences in DigCompEdu

Areas 1 and 2 refer to the educator's digital pedagogical competence which should be based on efficient, inclusive and innovative teaching and learning strategies. Anchored in the specific steps of any teaching process, mediated or not by digital technologies, are areas 1, 2 and 3, where area 2 refers to the planning process; area 3, to the moment of implementation and assessment; area 4, to teaching and learning; area 5, to the use of digital technologies in

teaching and learning strategies centred on the learner; and finally, area 6, which encourages learners to use digital technologies creatively and responsibly for information, communication, content creation and others. These competences are related to the progression model presented in this framework, which assumes helping educators to understand their strengths and weaknesses, systematising different levels of digital competence development (Figure 2).

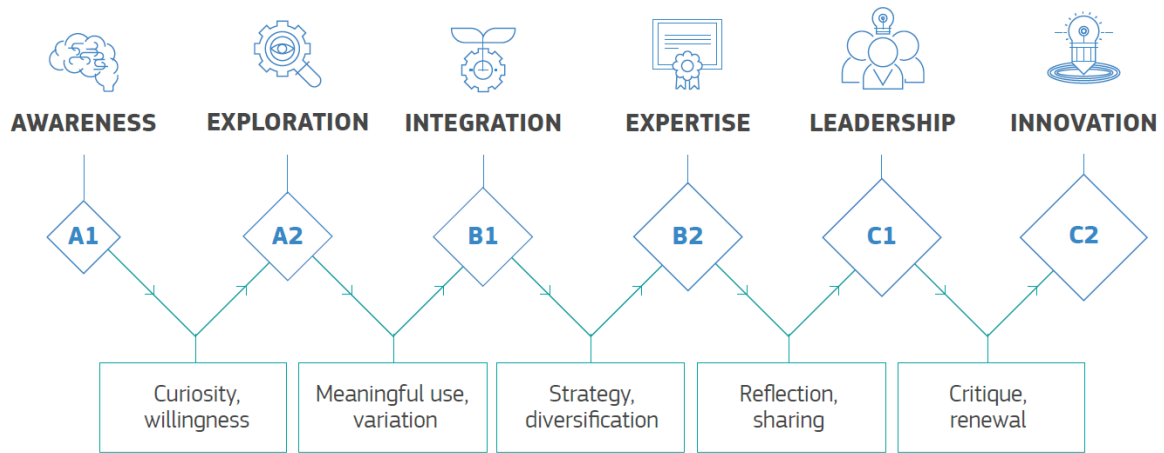


Figure 2: DigCompEdu Progression Model

The first two phases (A1; A2) require teachers to assimilate new information in order to develop their digital practices. The next two phases (B1; B2), foresee the teacher applying, deepening and reflecting on digital practices to reach the last two phases (C1; C2), which are the most complex of the process and which aim at transmitting their knowledge, criticising their practices and developing new practices (Redecker, 2017). These skills are fundamental in changing educational practices and, consequently, in renewing the teaching professional identity in the digital age (Quadros-Flores & Raposo-Rivas, 2017). The TPACK (Technological Pedagogical Content Knowledge) model meets these guidelines, since it advocates the combination of content, pedagogical and technological knowledge in a dynamic and interconnected way (Figure 3).

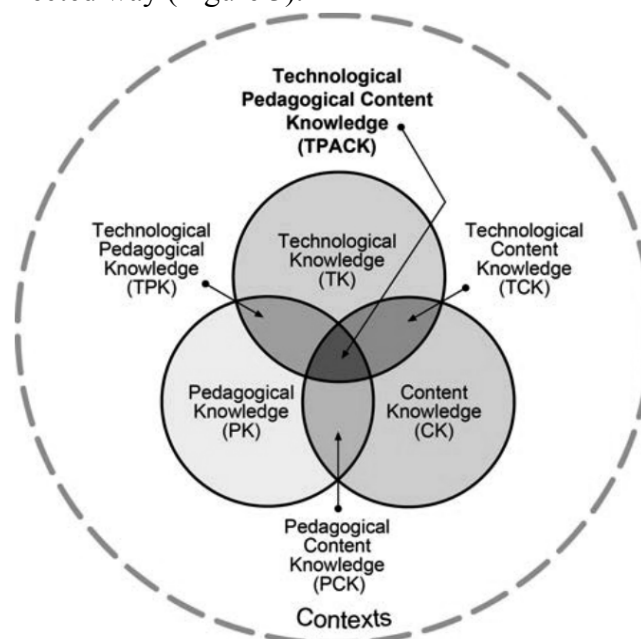


Figure 3: TPACK model

This model, created by Mishra and Koehler (2006), based on Shulman (1986), includes three main dimensions of knowledge: content (teacher's knowledge about curriculum content); pedagogy (teacher's knowledge about the teaching and learning processes: strategies, methods); and, finally, technology (technological knowledge and the ability to mobilize it in their educational practices). Several authors, such as Sampaio and Coutinho (2014), JaipalJamani and Figg, (2015) emphasize the importance of using this model in initial and continuing teacher education, as they consider it to be a training model that favours the construction and professional development of teachers.

These two references are relevant in this study because of the guidelines that promote the effective integration of ICT in educational practices. Within the scope of initial teacher education, it is important to know the knowledge of future teachers in the implementation of educational practices with ICT, three of which are highlighted in this article. The study of Graça et al. (2021) investigated the potential and knowledge of future teachers and concluded that there are factors that inhibit the integration of digital resources in educational practices and other drivers of such practices. The research of Raposo-Rivas et al, (2020) found that during this training period there is little creative and interactive use of technological resources, as well as the practice of innovative and active methodologies in real contexts. Finally, the study by Fonseca (2020) sought to investigate the training practices developed using ICTs in initial teacher training, finding difficulties in providing opportunities for future teachers to observe and experiment with the pedagogical uses of digital technologies.

In this sense, the teacher should use technology combined with active teaching methodologies based on social constructivist theories that advocate the student as an active, participatory and constructor of their own learning (Moran, 2018). Gamification, Project Based Learning, Problem Based Learning, Peer Instruction, Flipped Classroom, Just-in-Time Teaching, Design thinking and others (Silva, 2020) are some of these active methodologies, however, we highlight a pedagogical approach "From them to them: when processes become products and again processes" (Quadros-Flores et al, 2019) by combining three important steps in the learning process: the Flipped Classroom in the "prepare-do" in an individual way outside the classroom and Storytelling in the "do-tell" collaboratively in the classroom, where the student investigates, selects and collects information, uses doing together and learns, evaluates.

We know that in initial teacher training the development of innovative educational practices are conditioned by the availability and quality of technological equipment present in educational settings. In Portugal, the Ministry of Education (2020) has developed an Action Plan for Digital Transition "Digital Training of Teachers", to be implemented, which focuses on the development of teachers' digital skills necessary for teaching and learning in this new digital context. To this end, the Directorate General for Education (DGE) articulates with the Training Centres for School Associations (CFAE) the development of this initiative through a set of activities, including training workshops on 3 levels of digital proficiency. This plan is articulated with the European Framework of Digital Competence for Educators.

In Spain, the Ministerio de Educación y Formación Profesional (2022) in collaboration with the Autonomous Communities published the updating of the reference framework for teaching digital competence to adapt it to the evolution of digital technologies and their educational use. This framework is coherent with regional, state and European proposals on digital competences to guide the ongoing training of teachers and facilitate the development of a digital culture in the classroom. It is used as a tool for the design of their educational

policies in order to improve the digital competence of teachers to contribute to the acquisition and development of students' skills and to the proper functioning of educational centres.

Methodological options

This is a quantitative-qualitative study in which an online questionnaire survey (Ghiglione & Matalon, 2001) with open and closed questions was applied to Portuguese and Spanish future teachers who are in initial teacher training, namely in the Degree in Basic Education. The study involves the School of Education of Porto, the University of Minho and the University of Vigo, therefore the survey was collaboratively constructed, validated by a group of students from the different higher institutions. However, the responses of future teachers from Portugal and Spain were carried out in different media. The figures below show the number of responses. A total of 151 students responded, of which 111 were Portuguese students and 40 Spanish students.

The survey is divided into three parts: one part relates to the student's personal and academic information; another focuses on the availability of ICT resources by the student and internship centre; and the third part aims to collect detailed information on attitudes towards ICT, knowledge and use of ICT in educational practices. For the analysis of quantitative data, descriptive statistics were used to describe and summarise a set of data.

Analysis and discussion of the results

In the present work, only some questions from this questionnaire survey will be analysed, performing a comparative analysis of the data from Portugal and Spain: What are the main reasons that lead you to use technologies in your professional life; What kind of activities do you do with your students; What digital resources are available?

The first question aimed to investigate the reasons that lead future teachers to integrate digital technologies into their educational practices. The answers for the case of Portugal (P) are in Figure 4, and for the case of Spain (E) are in Figure 5.

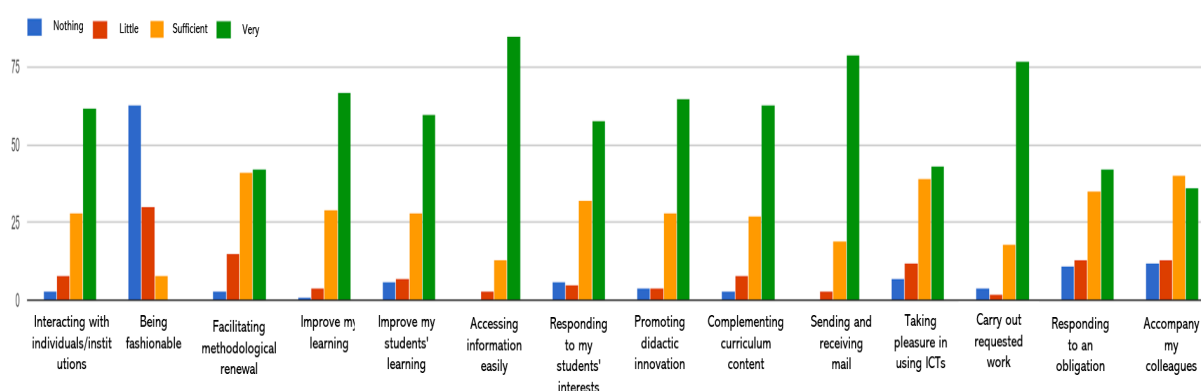


Figure 4: Responses to the question - "What are the main reasons that lead you to use technologies in your professional life?" (Portugal)

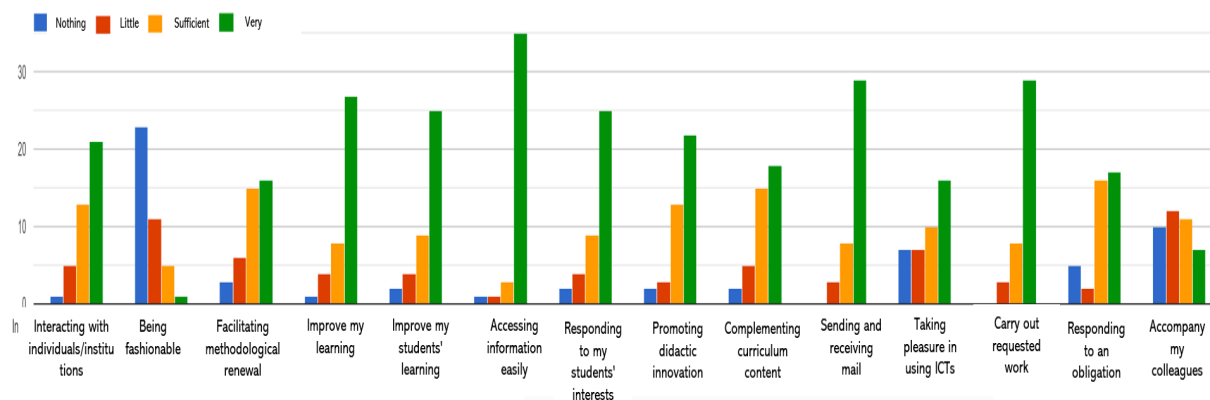


Figure 5: Responses to the question - "What are the main reasons that lead you to use technologies in your professional life?" (Spain)

Visually the two figures reveal similarities, despite the different percentages. In general, it can be seen that the majority of Portuguese and Spanish future teachers use digital technologies in their practices to "Access information easily" (P=76.5%; E=87.5%); "Send and receive mail" (p= 71.1%; E=72.5%); "Carry out requested work" (P=69.3%; E=72.5%); "Improve my learning" (P=60.3%; E=67.5%) and "Promote didactic innovation " (P=58.5%; E=62.5%). In Portugal the majority, in Spain almost the majority, assume as motivation "Complementing curriculum content" (P=56.7%; E=45%). The least significant reasons in the countries under study are: use by "Being fashionable" (P=0%; E=2.5%); "Accompany my colleagues" (P=32.4%; E=17.5%); "Facilitating methodological renewal" (P=37.8%; E=40%); "Taking pleasure in using ICTs" (P=38.7%; E=40%); "Responding to an obligation" (P=37.8%; E=42.5%).

The results show that most of the future teachers assume attitudes of a citizen in the information age, using digital spaces to communicate and access information relevant to their personal and professional lives. Also, as future professionals, most of them feel the need to recreate the pedagogical practice and complement curricular contents. We highlight that the current curriculum also involves curricular flexibility (DL n.º 55 of 2018) and refers to significant learning and methodologies that value interdisciplinarity and transdisciplinarity, so the result is understandable. The educational intentionality in the use of ICTs should also be highlighted, since future teachers do not use them because it is a fashion, few to accompany their colleagues or to respond to an obligation.

We wanted to understand what activities future teachers propose to their students by integrating ICT (Figure 6).

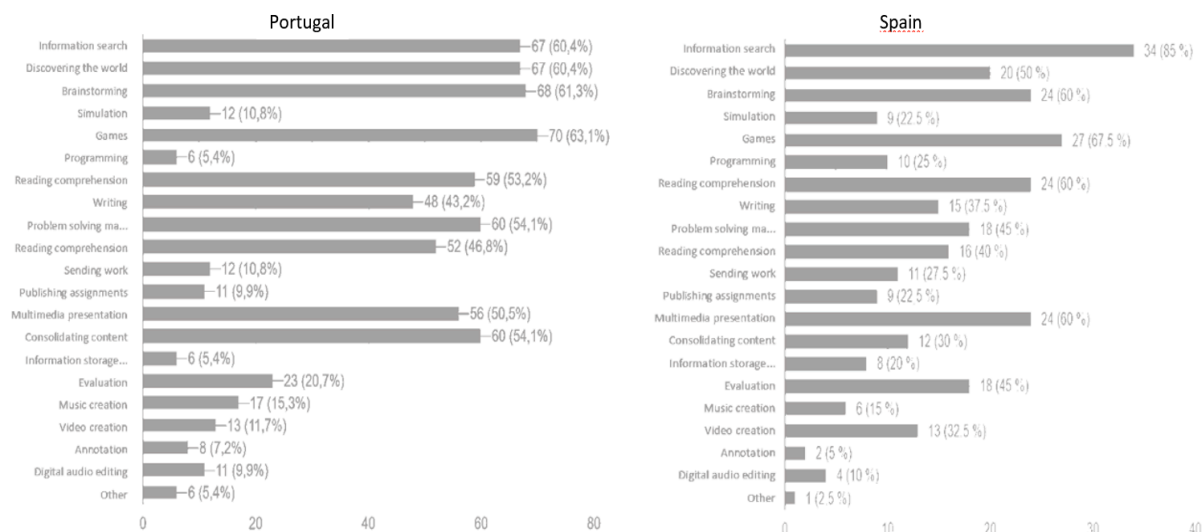


Figure 6: Responses to the question - "What kind of activity do you do with your students?" (Portugal and Spain)

Figure 6 reveals that most of the teachers carry out the same type of activities, although the percentages are different: use of "Games" (P=63.1%; E=67.5%), "Access to information" (P=64%; E=85%), "Discussion of ideas" (P=61.3%; E=60%), "Multimedia presentation" (P=50%; E=60%), "Understanding the world" (P=60%; E=50%). Still in Portugal, the majority perform "Mathematical problem solving" (P=54%; E=45%) and Consolidating contentedly (54.1%; E=30%). In the case of Games, according to Vygotsky (1998), the imaginary situation, or the assumption of make-believe, is a strategy that involves the child in the activity, developing multiple capacities in the scope of creation, decision and relationship, and it also contributes to the expansion of conceptual abilities. On the other hand, access to applications that promote comprehension activities is also fundamental, and there are applications that favour the schematic image of the understanding of the text, the visualisation of the whole and the parts, as is the case with conceptual maps.

Similarly, there are similarities in the type of activities less developed with ICT by the future teachers in the two countries (although with different percentages): "Simulation" (P=10.8%; E=22.5%), "video editing and creation" (P=11.7%; E=32.5%) and "music" (P=15.3%; E=15%), "Publishing assignments" (P=9.9%; E=22.5%), "Programming" (P=5.4%; E=25%), "Information storage" (P=5.5%; E=20" and "Annotation" (P=7.2%; E=5%).

Figures 7 and 8 reveal the digital resources most used by Portuguese and Spanish prospective teachers in their educational practices.

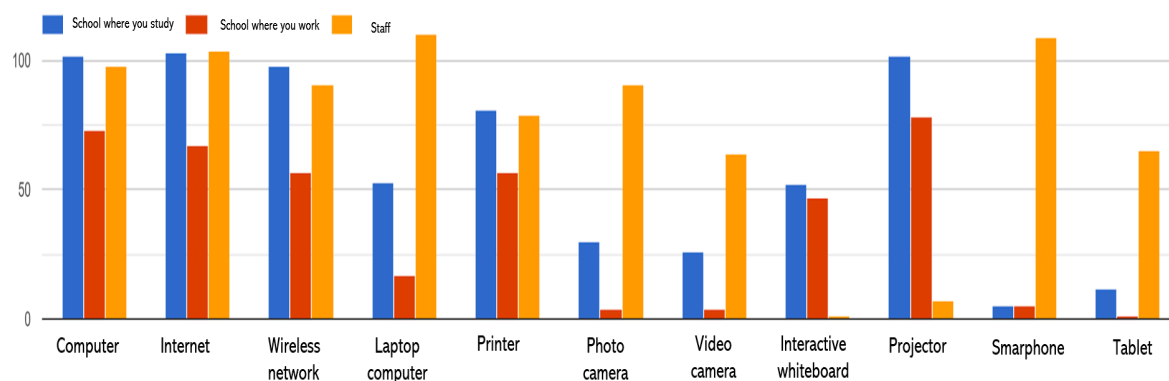


Figure 7: Responses to the question - "What digital resources are available?" (Portugal).

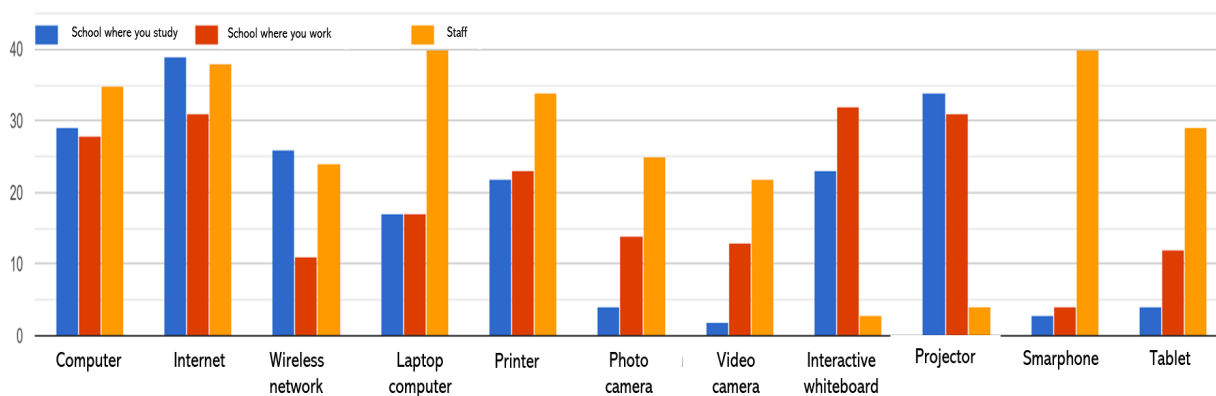


Figure 8: Responses to the question - "What digital resources are available?" (Spain).

Although with differences in percentages, overall the result is equivalent. Thus, it can be seen that the resources most used by future teachers in the two countries in the study are the student-in-training's own, private ones. They have tools which make them autonomous in accessing information and communication (Smartphone, Tablet, laptop, tools which include video and photo cameras). But they do not have basic tools that are found in classrooms, these are offered in a higher percentage by the Higher Education Institutions and in a lower percentage by the Training Centres where the Supervised Teaching Practice takes place: Computer, Internet, Wireless Network, Projector, Interactive Board and Printer.

Conclusion

Certain that initial teacher training is a key moment in the beginning of the construction of teaching professionalism, that develops throughout professional life, in a dynamic process of construction of the teaching professional identity, we wanted to know the thoughts of future teachers regarding their motivations and technical and pedagogical knowledge in the integration of Information and Communication Technologies (ICT) in educational practices.

The analysis of the results leads us to conclude that, despite some differences in percentages, in general there are no significant differences in the opinion of future teachers in Portugal and Spain. Thus, the motivations for the use of ICT by future teachers are mainly due to personal and professional development reasons: learning to be in order to better teach to learn. Future teachers show that they are preparing themselves to be a digital professional, one who uses technology responsibly, ethically and with respect for others, so they do not use it because it

is fashionable or because others use it. They demonstrate autonomous skills in the construction of professional knowledge, thanks to the potential of new technologies to access information and applications that support the teaching and learning process. The activities referred to escape the banking paradigm, as designed by Paulo Freire (1985) and stimulate student activity, although multimedia presentations may consolidate this paradigm if not used with active pedagogies. They reveal some pedagogical knowledge, although they show some weaknesses, namely in simulation, programming, video and music creation and editing, etc.

With regard to the resources used, there seems to be a trend for educational institutions to offer resources that facilitate the student's personal or collective use of digital technologies, such as the computer, the wireless network and the interactive whiteboard. In this sense, the student uses his personal resources in the learning process. It is noted, however, that higher education institutions are better equipped with resources that facilitate the use of other technologies in the teaching and learning process than the Training Centres.

Aware of the limit of the study, we hope to contribute to a reflection on initial teacher training, given that we believe that technology, when integrated in a pedagogical and ethical way, resizes teaching professionalism aligning it to the culture of the third millennium with new dynamics and identity strategies that give meaning to change (Quadros-Flores & Raposo-Rivas, 2017).

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