Education Quarterly Reviews

Barbosa, Gabriela, and Aguiar, Ana. (2018), Challenges of Digital and Teacher Training. In: *Education Quarterly Reviews*, Vol.1, No.2, 131-140.

ISSN 2621-5799

DOI: 10.31014/aior.1993.01.01.14

The online version of this article can be found at:
https://www.asianinstituteofresearch.org/

Published by:
The Asian Institute of Research

The Asian Institute of Research *Education Quarterly Reviews* is a peer-reviewed International Journal. The journal covers scholarly articles in the fields of education, linguistics, literature, educational theory, research, and methodologies, curriculum, elementary and secondary education, higher education, foreign language education, teaching and learning, teacher education, education of special groups, and other fields of study related to education. As the journal is Open Access, it ensures high visibility and the increase of citations for all research articles published. The *Education Quarterly Reviews* aims to facilitate scholarly work on recent theoretical and practical aspects of Education.

ASIAN INSTITUTE OF RESEARCH
Connecting Scholars Worldwide

The Asian Institute of Research
Education Quarterly Reviews
Vol.1, No.2, 2018: 131-140
ISSN 2621-5799

DOI: 10.31014/aior.1993.01.01.14

Challenges of Digital and Teacher Training

Gabriela Barbosa[1], Ana Aguiar[2]

[1] Escola Superior de Educação, Instituto Politécnico de Viana do Castelo, Portugal. Email: gabriela.mmb@ese.ipvc.pt
[2] Escola Superior de Educação, Instituto Politécnico de Viana do Castelo, Portugal. Email: anaaguiar@ese.ipvc.pt

Abstract
The broad development of digital technologies (TD) and their ubiquity in actual students are factors that cannot be ignored by the school and teacher. The present students were born in the digital era and wish to find in school rich environments in technology, meeting motivations. It is a school's commitment to ensure and to promote quality and expectations in teaching. It is hoped that teacher organize his pedagogical practice in a coherent and balanced process, using digital as a resource to improve the learning environment. The research shows that a factor influencing teachers' adoption of TD results from the technological experiences included in training programs. Therefore, this study examine how teachers integrate TD in pedagogical practice and how initial or continuing training programs influence this use. The study involved primary school teachers and finalist students of master's degrees in education, and was restricted to TD in the Portuguese class. For data collection, we used online questionnaire survey and interviews. The conclusions highlight how teachers' learning influences the effective integration of TD in class. There is a need for a profound didactic-pedagogical intervention in the initial and continuing teacher training programs, including the knowledge in using TD in school learning.

Key Words: Training, Teachers, Technologies

1. Statement of the Problem

The broad development of digital technologies and their ubiquity in the everyday life of the 21st century student cannot be ignored by the school and education professionals. The students that teachers currently receive in their class were born in the digital age and wish to find in school rich technological environments that fulfill their learning needs and motivations. Thus, we will say that it is the school's commitment to guarantee and promote the teaching quality. It is expected that the teacher organizes his pedagogical practice, adapting it to the reality of the school and its students, in a coherent and balanced process, using technology as a resource to improve the learning environment (Heitink (Heitink, Voogt, Fisser, Verplanken, & Braak, 2017).

At this level, and as an obvious consequence, the preparation of future teachers to integrate technology into their educational practice is the challenge that teacher training institutions (IFPs) and those responsible for such training face (Liu, 2016). Enabling future teachers for the effective integration of technologies implies training programs in line with this purpose. That is, programs that help future teachers develop knowledge about how to integrate technology in the promotion of learning.

Most of the students who are currently doing their vocational master's in teaching are a part of the so-called Generation Z, made up of people born between the mid-1990s and mid-2010, that are usually characterized by digital natives. They have grown along with digital technology, are actively involved with the internet, social networks, use their mobile phones at all times and are regular users of Instagram, Snapchat, WhatsApp, Facebook. However, there is a perception that teachers who are currently teaching in Portuguese schools also are familiar with technology, have a personal computer, know the internet, communicate through email and use

social networks (Barbosa, 2016; Barbosa & Pereira, 2016; Castro, 2014). Although it is recognized that these two groups are technically more skilled and more entangled with the digital media, this knowledge and use alone do not make them competent to integrate TD in the curriculum, using them as a support for methodologies, implementing collaboration and modeling the process of self-learning.

The reference literature makes explicit that the integration of TD in classroom practice is a complex, difficult task and that sometimes it's capable of generating some stress in teachers (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). The presence of TD in the learning support brings changes in the pedagogical organization of the classroom, it modifies the way learning is managed, the presentation and exploration of contents are different, as are the time of tasks, the dynamics of interactions and collaborative work, and, from this assumption, it is understood that TD does not always fit the culture of teaching practiced, and may even penalize the teacher's sense of effectiveness. A second type of problem arises from the technological instability, in effect at all times arise hardware updates and new applications of software, there is a supersaturation of data that increase some anxiety and insecurity for the teacher when not understanding how to process all the innovation (Mouza, Nandakumar, Yilmaz Ozden, & Karchmer-Klein, 2017). To conclude this set of considerations, it should also be noted that TDs are not neutral or impartial. Particular technologies have their own tendencies, possibilities and limitations that make them more appropriate for certain tasks than others, and this is a fundamental knowledge for the teacher when selecting TD for the pedagogical task that he intends (Costa, Rodriguez, Cruz, & Fradão, 2012). Problems of this order, explained throughout this paragraph, advise that in a work that advocates for Didactics, ways of understanding and planning the integration of TDs in the classroom are discussed and explored.

The research shows that one of the factors influencing the adoption of TD in the pedagogical practices of the new teachers results from the limited technological experiences included in their training programs. In fact, several researchers are unanimous in concluding that the training in question has some shortcomings, with a very great focus on what comes closest to theoretical knowledge and tutorial clarifications of digital educational resources, then with the experience of learning situations which can be reconfigured in actual classroom practice. Koehler and Mishra (2009) say that the teachers did not receive inadequate training to use technology in their pedagogical practices. The approaches to teachers' professional development offer a unique approach to technological integration when, in fact, teachers operate in a variety of teaching and learning contexts. In this sense, Koehler, Mishra and Cain (2013) indicate as fundamental "an approach that treats teaching as an interaction between what teachers know and how they apply this knowledge in the unique circumstances or contexts within their classrooms" (p.14). Therefore, the integration of technology must be planned according to the intentions and specific subjects in specific contexts of the classroom. This means that it is essential to provide the future teachers with learning strategies with the integration of technological resources, coherent and articulated with those they will find in the levels of education for which they are being formed (Ottenbreit-Leftwich et al., 2012; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). To assume such a position also presupposes that it responds to the different knowledge that, in interaction, regulates the knowledge necessary for the effective integration of technology in pedagogical practice. Ramos, Teodoro and Ferreira (2011) put the technological and pedagogical knowledge of teachers as a condition for the integration of TD in school. Costa, Rodriguez, Cruz and Fradão (2012, p. 24) add that it is essential to have "some technological knowledge, without which it will be difficult to make informed and informed decision-making", however, it is necessary to articulate it and make it coexist with pedagogical knowledge and knowledge of content or discipline. According with that points, the theoretical model developed by Mishra and Koehler (2006), designated by technological pedagogical content knowledge (known in the literature by the acronym TPACK). The TPACK framework describes knowledge domains that are relevant for teachers to implement technology in their teaching practices. Based on the pedagogical knowledge of content (PCK) model, developed by Shulman (1987), we know that teachers' knowledge is not limited to general pedagogical knowledge about processes and practices or teaching methods (PK), nor to knowledge about the disciplinary content that each teacher (CK), but it is necessary the PCK, that is, teachers are able to integrate domain knowledge with appropriate pedagogical approaches so that students can understand the subject. TPACK reconfigures the PCK model by adding the domains of technological knowledge (i.e., technological knowledge [TK]). This knowledge comes to join the others, and is creating new knowledge resulting from the intersections between all areas, technological pedagogical knowledge (TPK), the technological content knowledge (TCK) and the technological pedagogical content knowledge (TPACK). "TPACK emphasises the importance of preparing pre-service teachers to make sensible choices in

their uses of technology when teaching particular content to a specific target group" (Tondeur, Scherer, Siddiq, & Baran, 2017, p. 46). So, the teachers need to understand how to shape instructional practices in which technological, content and pedagogical knowledge are embedded.

TPACK emerges when the teacher, in order to teach a specific content, uses the pedagogical method / strategy he considers most appropriate and in sequence selects the technological tool with the most potential for students to construct knowledge in a differentiated, meaningful or even more easy and fast. This means that TPACK emphasizes the multiple interactions between:1) the knowledge about the different technological tools and the potential they have to realize learning situations, perceiving limitations and pedagogical possibilities; 2) the way in which the use of a given tool can motivate the students to the activities and promote strategies of collaborative work and learning in interaction between peers; 3) an understanding of how technology tools and content are related, influencing and limiting each other, making the teacher in a disciplinary area to opt for a particular technological resource because it will help students learn a particular programmatic topic better; 4) the diverse elements that characterize the teacher's work contexts, such as infrastructural, cultural, socioeconomic aspects, and interferences or influences in the integration of digital technologies in classroom activities. Koehler and Mishra (2009) consider that "social and contextual factors also complicate the relationships between teaching and technology" (p.61). Indeed, teachers do not always find the guidance and support they need to integrate technology into their classroom work (Agyei & Voogt, 2011; Harris & Hofer, 2011; Scherer, Tondeur, Siddiq, & Baran, 2018b; Tondeur, 2018)

This quickly sketched framework allows us to establish the orientation that should be present in initial teacher education programs: to include in curricula, disciplinary units on technological knowledge, but also appropriate spaces for the construction of knowledge in order to integrate technology in the field the specificity of the discipline to which the future teachers are being trained. Several researches on the development of ICT skills for pre-service teachers show that technology must be introduced into the throughout the curriculum in order to provide pre-service teachers with the experiences needed to apply technology to their specific content areas (Ottenbreit-Leftwich et al., 2010; Tondeur et al., 2012; Tondeur, van Braak, Siddiq, & Scherer, 2016). Indeed, practical experiences around the world have corroborated the potential of such integrated approaches. To prepare future teachers for the effective use of technology, they need specialized instruction on how they teach their core content with technology (Mouza, Karchmer-Klein, Nandakumar, Yilmaz Ozden, & Hu, 2014; Mouza et al., 2017; Shinas, Karchmer-Klein, Mouza, Yilmaz-Ozden, & J. Glutting, 2015).

In this context, we intend in this text to present a study carried out under the training of 1st CBE teachers to integrate technology in teaching practice. In line with the literature presented above, we try to understand how the integration of technology in their curriculum and in the specific area of the Portuguese Didactic class influences the use the TD in their teaching practice. At this point, the first move is to try to understand how teachers and preservice teachers use TD in the Portuguese class, in order to understand, in a moment later, the way in which initial or continuing training programs influence this use. The questions that guided this study are: 1) What TD are used by teachers and preservice teachers in Portuguese class? 2) What domains and learning objectives are used? 3) What training in educational technology do the participants have? What relationship is there between the use of TD in class and the teacher education in educational technology? The study involved teachers from the 1st Cycle of Basic Education (CBE) and preservice teachers (PT) of the master's in teaching of the 1st. CBE and Portuguese and History and Geography of Portugal of the 2nd CBE and the Master's Degree in Pre-school Education and Teaching of the 1st Cycle of Basic Education.

2. Methodological Procedures

Considering the problematic under study, it was considered pertinent to follow a descriptive and interpretative methodological framework, since it was perceived that it would be the most adequate to understand the declarations about the practices of the teachers in the level of the integration of TDs and to establish relations between the use of TD and training acquired for such use.

The sample consisted on teachers from the 1st Cycle of Basic Education (CEB) in the active, from the northern region of the country, who had never held the position of cooperating teachers and preservice teachers (PT) to attend the Masters in Teaching of the 1st. CBE and Portuguese, and History and Geography of Portugal of the 2nd CBE, and also in Pre-School Education and Teaching of the 1st Cycle of Basic Education. Fifteen teachers and fifteen PS participated.

The online questionnaire and face-to-face interviews were the instruments selected for data collection. The questionnaire was conducted through Google's survey software, which was available for free on the web and was divided into five topics: 1) Personal and professional data of the respondents; 2) Access to digital technologies; 3) Use of TD in Portuguese class; 4) Advantages of using TD in Portuguese class; 5) Problems in the use of TD in Portuguese class. The issues in topics 1, 2, 4 and 5 were, for the most part, closed, multiple choice, and selection of response options; the issues of topic 3, given the nature of the topic, were open-ended. Indeed, it was important to negate any kind of response orientation and to give as much freedom as possible to the linguistic-textual construction of the response. The face-to-face interviews had a semi-structured script based on the questions of the online questionnaire, supplemented with questions focused on the topic of training acquired in TD, and were carried out after the participants' participation in the online questionnaire. For the study presented here, only data related to topics 1 and 3 of the online questionnaire and the data collected during the interviews were considered.

B) TD on Portuguese Class	**Portuguese learning domains**	Reading and Literary Education
		Writing
		Orality
		Grammar
C) TD training	**Certificate of Digital Competence**	Certificate of Digital Competence (N1)
		Certificate of pedagogical and professional competence with ICT (N2)
		Certificate of advanced ICT competencies on education (N3)
	Training actions attended under the 9th article of the legal regime of the continuous training of teachers	
	Training acquired in the context of initial training	

Figure 1 – Categories of Analysis

The analysis and discussion of the data was made regarding the following dimensions of analysis: A) Characterization of the participants; B) TD in Portuguese class; and C) Training in TD. Regarding the analysis dimension A, we have gathered the information corresponding to gender, age, professional experience and academic qualifications. For dimension B, the data collected were organized according to the domains and learning objectives of Portuguese foreseen in the official program documents. Finally, in dimension C, three categories of analysis were defined: i) the training acquired by the teachers in the ambit of the ordinance n.º 731/2009 that created the system of training and certification in ICT competences (information and communication technologies) for teaching staff in pre-school and elementary and secondary education establishments; ii) training in ICT acquired in the context of continuing training, governed by Article 9 of the legal regime of continuing teacher training; and iii) training in technologies acquired in the context of initial teacher training. The figure 1 shows the summary table of dimensions and categories B and C for data analysis.

3. Results and Discussion

A) Characterization of participants

Regarding the characterization of the participants, as previously mentioned, they agreed to collaborate in the study on a voluntary basis, answering the online questionnaire and interview, 15 teachers teaching in schools of the 1st CBE of the northern region of the country and 15 students attending the Master's in Teaching of the 1º. CBE and Portuguese and History and Geography of Portugal of the 2nd CBE and in Pre-school Education and Teaching of the 1st Cycle of Basic Education, in the analysis of data referenced as trainee teachers, PE. The teachers' group consisted only of female members and was located in terms of age groups, mostly between 51 and 60, maturity very consistent with the reality of this professional group in the national territory. When considering the academic qualification of the teachers, it is verified that all are licensed or equivalent to a course of complementary training, academic degree in accordance with what is required for the professional category,

one also presents a postgraduate in pedagogical supervision and another a master's degree academic in this specialty. The group of PTs, similar to the group of female teachers, was also made up of female-only members, all of whom were under the age of 25, a characterization that confirms the orientation of initial teacher training in the national territory. In academic terms they were graduated in Basic Education and were finishing a professional degree.

B) Use of TD in Portuguese class

The data on which we analyze this dimension of analysis results from the responses to the online questionnaire and the interviews conducted. The information gathered from these instruments has allowed us to understand the TDs that the participants say they use to concretize Portuguese learnings in class context. In fact, in the information collected, three types of information stand out more or less distinctly: information on the Portuguese domains in which TD is mobilized; the information about the learning objectives that appear valued in this use and the information about the typology of TD referred to. When considered together, this information allows a very clear design on the use that teachers and PT make of TD in Portuguese class (Figures 2 and 3).

In a more detailed description and interpretation, we find that, in relation to the fields of Reading and Literary Education, taken together, the presented data show a very different practice between the teachers and the PT, as observed in figure 2., firstly the diversity of digital technological resources and applications designated by the PT as opposed to those indicated by the teachers. Teachers essentially rely on editorial platforms and search engines, such as Google, to access content. These data are consistent with research already done elsewhere (Barbosa & Pereira, 2016). Teachers now have easy access to a variety of software and digital educational resources made available by the publishing industry specializing in the production of school materials. Various digital services, products, resources and educational materials are distributed to faculty through proprietary platforms, upon prior registration, and / or through the adoption of a particular editorial project. These digital resources function as satellite documents of school textbooks, having a very valued presence in the classroom, right from the level of didactic work around Reading and Literary Education.

Still regarding the data represented in figure 2, we highlight, secondly, the information about the learning objectives that appear valued in the work with TD. In both the questionnaire and interview data, it was very clear that the two groups of participants use the TD in their pedagogical work about reading and listening to read various texts and the consequent appropriation of vocabulary in order for the students to read fluently, to know literary works of reference and to contact with texts associated essentially for informative purposes.

Nevertheless, it is perceived that PT has technological know-how and makes a more productive and varied use of TD. The use of technologies for publishing and sharing content to access images and videos, such as YouTube and the National Reading Plan (NLP) portal, as well as the use of applications that allow you to create presentations and videos animated power to implement pedagogical situations that we interpret not only as more varied but also more creative and stimulating for the learning environment, such as the PowToon, for example. However, regarding the learning objective, development of textual comprehension, it was observed that only PTs exploit this goal through the use of TD. In this regard, a selection of digital tools and applications such as HotPotatoes, Kahoot, Plikers and Flashcards, through which PTs create content in the form of interactive exercises, such as multiple choice, selection questionnaires multiple, true / false, or short answer; lacunar text exercises; crosswords; with a strong playful component, these TDs engage students enthusiastically in the work of reading and understanding the text. Thus, what these data reveal is a tendency to recognize that PTs are more familiar with TDs than teachers and use them in a planned and intentional way.

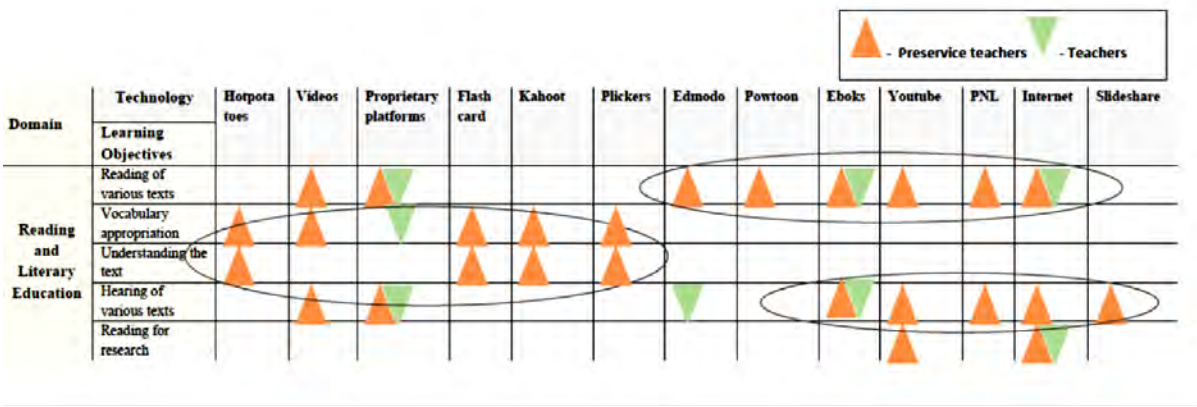

Figure 2 – TD on the domains of Reading and Literary Education

The analysis carried out in the Writing domain confirms the orientation that we identified in Reading and Literary Education. As can be seen in figure 3, there is a number and variety of TD identified by the EPs that are absolutely different from those that are pointed out by the teachers. As the data in figure 2 have shown, PTs show a much more solid technological knowledge of content than teachers. See, in this regard, the TDs that indicate for the work around spelling learning: GoConqr, HotPotatoes, Kahoot, Plikers, Word Processing Software and PowerPoint. These resources allowed the PT to flex the learning environments of the orthographic code, making the motivation and the taste of learning coexist in a balanced way with the involvement in the construction work of the learning.

The PT stated that they had elaborated phoneme-grapheme correspondence exercises, exploring contextual and morphosyntactic regularities, fixing specific registers, associating and manipulating graphemes, diagnosing and orthographic correction, in order to deepen and consolidate the correct forms of writing the words, and in function of these pedagogical intentions is that they selected the TDs that they considered adequate and compatible with the school contexts.

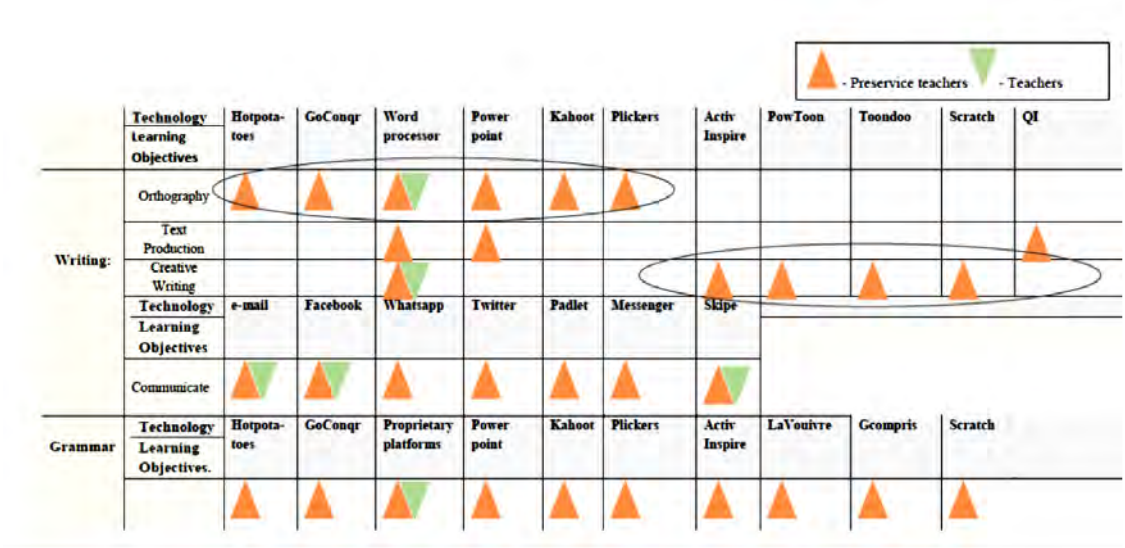

Figure 3 - TD on the domains of Writing and Gramma

Also in the Writing field, it is important to highlight the data obtained regarding the specific work in creative writing. Also, at this level, the difference between the TDs used by the teachers and the PT is very expressive. While the former refers only to the use of word processing software from Microsoft Word, PT also identifies other applications with real potential for students to develop a positive and pleasant relationship with writing. Through PowToon, Toondoo and Scratch are several multimedia tools that appeal to the imagination and offer situations that favor attention and concentration around the writing process, facilitating the production of writing objects combined with image, music, sound and animation.

When we compare the results according to the TDs used in the different learning objectives of the Writing domain, it is clear that the PTs select the TDs in a particular way, in a direct and coherent relationship between the potential they present and the specific learning objectives that want to see realized. This orientation has been reinforced as we move forward with the description and interpretation of the data. In the same sense, the TDs are more oriented towards the development of communicative and linguistic skills, either with the intentionality of disseminating and sharing documents and works carried out, for example through Padlet and Facebook, or in interpersonal communication, more asynchronous in the use of email, or in communication with more possibility of occurring in real time through MSN Messenger, WhatsApp, Twitter and Skype. The EPs mentioned that they have taken advantage of the more socially oriented TDs to value the work around the binding aspects of an effective interaction, such as the rules of linguistic courtesy, especially forms of treatment, greeting, opening and closing of statements.

In the domain of Grammar, similar to the observed and commented for the previous domains, a very different TD integration between the two groups is again visible. Teachers indicate that they use only digital content provided by editorial platforms, whereas PT points out a wide range of applications and software with educational potential and whose characteristics allow to generate activities of a very diverse nature and pedagogical function: observation and exploration of linguistic occurrences, problematization and description of the rules and grammatical processes that structure and govern the uses of language, training and systematization of grammatical knowledge. The PT therefore perceived the multiple possibilities that TD offer to work dynamically, interactively and in some situations playful, curricular contents usually ungrateful for the students, as is the case of grammatical knowledge.

In summary, it seems to be possible to talk about the use of TD in the Portuguese class, which: i) the PT makes a greater and more varied integration of TD in the learning; ii) the selection and uses that PT makes of TD are determined by the pedagogical tasks and domains and subdomains of the Portuguese; iii) the teachers present neutral and relatively limited uses of TD in Portuguese learning.

C) Training in TD

We wanted, within this category, to identify which training in educational technology had the participants acquired. As can be seen in Figure 4, while the teacher training was already developed in the exercise of their professional activity, the formation of PT was acquired in the context of initial training. Five of the teachers revealed that they had the level 1 digital competency certificate, and that it was attributed to teachers who showed proof of having knowledge for an instrumental use of ICT as functional tools in their professional context (ordinance no. 731/2009). In addition to this data, all the teachers stated that they have attended in recent years various actions of continuous training in the field of information and communication technologies applied to education.

This training was mainly focused on the Microsoft Office and Open Office productivity tools, especially multimedia presentations, spreadsheet and word processor programs. Some teachers report having attended many hours of ICT training, but they have difficulty remembering with some precision what it would consist of. However, the teachers' concern to develop skills for the use of TD in learning is still perceived, and, in this sense, the sharing of experiences and information that they perform among peers in their professional contexts is used, although we believe that it is usually, and marked by an instrumental and unreflective logic.

Categories	Training	Teachers	Preservice teachers
Certificate of Digital Competence	Certificate of Digital Competence (N1)	**5**	
Continuous Training (9th article of the legal regime)	General: Windows apps and programs	**15**	
	Educational platforms	**1**	
Training (in the context of initial training)	Digital Technologies (on education)		**15**
	Portuguese language teaching (and digital technology) Master's degree		**15**

Figure 4 – ICT training

Regarding the formation of PT, as shown in figure 4, it is clearly different from that observed in teachers. In fact, the EP declared to have had, during the Degree in Basic Education, a curricular unit oriented specifically for the technologies in educational environment. And in this context, they explored the theme around digital educational resources; platforms and repositories; emerging digital technologies and trends, challenges and important developments in education technology. However, and in a particularly specific way, within the scope of the Didactics of Portuguese course, they had the opportunity to develop knowledge about the integration of TD in Portuguese learning. They not only deepened the technological knowledge but also articulated it with the pedagogical and didactic specificities of the Portuguese curriculum. In fact, the PTs had highlighted the importance about the opportunity to find a huge variety of technological resources ((software, technologies applications, electronic educational portals, Web pages), and to understand how to access it in a free way. To know resources are important condition for technology integration (Tondeur et al., 2012). Thus, they did the pedagogical exploration of the TDs, designing innovative learning scenarios and planning didactic sequences, always in a reflexive process between the content of the learning, the pedagogical function and strategy and the potentiality of TD, aiming at a significant and critical practice. It was unequivocal in the statements of the EPs given in the interviews that the more contextualized and specific training they developed in the curricular unit of Portuguese Didactics was crucial for the subsequent integration that they made of the TD in the real classroom context during the Supervised Teaching Practice. This finding is consistent with other studies that indicate the importance of future teachers having adequate opportunities to observe, practice, or model the effective integration of technology in the classroom (Mouza et al., 2017; Shinas et al., 2015; Tondeur et al., 2012). When we cross the data obtained between category B - Use of TD in the Portuguese class with the data of category C - Training in TD, it seems legitimate to interpret that a more specific and realized formation in line with the objectives and contents of learning has as a consequence, more sustainable and effective practices of integration of TD in Portuguese class. The PTs also reported the collaboration with peers, the supervisor's feedback and think over the the role of technology in Portuguese class. This is also an evidence reported in research (Mouza et al., 2014; Scherer, Tondeur, Siddiq, & Baran, 2018a)

4. Conclusion

The title we chose for this study - Challenges of digital and teacher training - aimed to highlight some critical aspects that can support teachers' learning for the effective integration of TD in the classroom. We identified these aspects based on practices reported by teachers and by PT, and from the TD formation that the two groups acquired. We cross over these data and find evidence in favor of a training conducted in the context of a specific didactics . In this understanding, three learning ideas for the integration of TD in pedagogical context are highlighted: i) the knowledge and technological skills that teachers acquire are not sufficient conditions for the curricular use of TD in learning (Lei, 2009; Margaryan, Littlejohn, & Vojt, 2011); ii) technological knowledge is necessary, but oriented to the way it interacts with the pedagogical knowledge and knowledge of the content of each particular discipline (Koehler & Mishra, 2009; Mathew J. Koehler, Punya Mishra, & William Cain, 2013; Scherer et al., 2018b; Tondeur, 2018); iii) initial and continuing teacher training for TD should be based in authentic teaching situations and contexts (Ottenbreit-Leftwich et al., 2012; Tondeur et al., 2012; Tondeur et al., 2016). Important is not to use technology per se, important is to create learning environments adapted to the

reality of schools and students today, technologies are part of this scenario and are there to diversify methodologies, flexible practices and enhance learning. The results of this study help to recognize the importance that must be given in the preparation of future teachers for the effective use of technology in Portuguese class. Studies with more significant samples are needed.

References

Agyei, D., & Voogt, J. (2011). *Computers & Education, 56*(null), 91.

Barbosa, G. (2016). Integração dos recursos digitais na aula de português – Que conhecimentos revelam os professores? . *Indagatio Didactica, 2*(2), 153-164.

Barbosa, G., & Pereira, J. (2016). *A integração dos recursos educativos digitais na aula de Português (?).* Paper presented at the V Simpósio Internacional de Ensino de Língua Portuguesa / V FIAL, Braga.

Castro, C. G. d. S. (2014). *A utilização de recursos educativos digitais no processo de ensinar e aprender: práticas dos professores e perspetivas dos especialistas* (Doutoramento), Universidade Católica, Portugal.

Costa, F. A., Rodriguez, C., Cruz, E., & Fradão, S. (2012). *Repensar as TIC na educação - O professor como agente transformador*: Santillana.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-423-435. doi:10.1016/j.compedu.2012.02.001

Harris, J. B., & Hofer, M. J. (2011). Technological Pedagogical Content Knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. *Journal of Research on Technology in Education, 43*(3), 211-229.

Heitink, M., Voogt, J., Fisser, P., Verplanken, L., & Braak, J. v. (2017). Eliciting teachers' technological pedagogical knowledge. *Australasian Journal of Educational Technology, 33*(3), 93-109.

Koehler, M., & Mishra, P. (2009). What is Technological Pedagogical Content Knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education, 193*(3), 13-19. doi:10.1177/002205741319300303

Koehler, M. J., Mishra, P., & Cain, W. (2013). What Is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education, 193*(3), 13-13-19.

Lei, J. (2009). Digital Natives as Preservice Teachers: What Technology Preparation Is Needed? *Journal of Computing in Teacher Education, 25*(3), 87-87-97.

Liu, S. H. (2016). Teacher education programs, field-based practicums, and psychological factors of the implementation of technology by pre-service teachers. *Australasian Journal of Educational Technology, 32*(3), 65-79. doi:doi.org/10.14742/ajet.2139

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education, 56*(2), 429-440. doi:https://doi.org/10.1016/j.compedu.2010.09.004

Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record, 108*(6), 1017-1054.

Mouza, C., Karchmer-Klein, R., Nandakumar, R., Yilmaz Ozden, S., & Hu, L. (2014). Investigating the impact of an integrated approach to the development of preservice teachers' technological pedagogical content knowledge (TPACK). *Computers & Education, 71*, 206-221. doi:https://doi.org/10.1016/j.compedu.2013.09.020

Mouza, C., Nandakumar, R., Yilmaz Ozden, S., & Karchmer-Klein, R. (2017). A Longitudinal Examination of Preservice Teachers' Technological Pedagogical Content Knowledge in the Context of Undergraduate Teacher Education. *Action in Teacher Education, 39*(2), 153-171. doi:10.1080/01626620.2016.1248301

Ottenbreit-Leftwich, A. T., Brush, T. A., Strycker, J., Gronseth, S., Roman, T., Abaci, S., . . . Plucker, J. (2012). Preparation versus practice: How do teacher education programs and practicing teachers align in their use of technology to support teaching and learning? *Computers & Education, 59*(2), 399-399-411. doi:10.1016/j.compedu.2012.01.014

Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education, 55*(3), 1321-1321-1335.

Ramos, J. L., Teodoro, V. D., & Ferreira, F. M. (2011). Recursos educativos digitais: reflexes sobre a prática. Cadernos SACAUSEF, VII. pp.11-34. *Cadernos SACAUSEF, VII*, 11-34.

Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2018a). Full length article: The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge: Comparing

structural equation modeling approaches. *Computers in Human Behavior, 80*, 67. doi:10.1016/j.chb.2017.11.003

Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2018b). The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge: Comparing structural equation modeling approaches. *Computers in Human Behavior, 80*, 67-80. doi:https://doi.org/10.1016/j.chb.2017.11.003

Shinas, V. H., Karchmer-Klein, R., Mouza, C., Yilmaz-Ozden, S., & J. Glutting, J. (2015). Analyzing Preservice Teachers' Technological Pedagogical Content Knowledge Development in the Context of a Multidimensional Teacher Preparation Program. *Journal of Digital Learning in Teacher Education, 31*(2), 47-55. doi:10.1080/21532974.2015.1011291

Shulman, L. (1987). Knowledge and Teaching: Foundations of the New Reform. *Harvard Educational Review, 57*(1), 1-23. doi:10.17763/haer.57.1.j463w79r56455411

Tondeur, J. (2018). *Enhancing future teachers' competencies for technology integration in education: Turning theory into practice*.

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2017). *A comprehensive investigation of TPACK within pre-service teachers' ICT profiles: Mind the gap!* (Vol. 33).

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education, 59*(1), 134-134-144. doi:10.1016/j.compedu.2011.10.009

Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. *Computers & Education, 94*, 134-134-150. doi:10.1016/j.compedu.2015.11.009