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INDEX

Challenges of digital competence and media literacy for open and online education

Retos de las competencias digitales y alfabetización mediática para una educación abierta y en red

Desafios das competências digitais e alfabetização midiática para uma educação aberta e em rede

EDITORIAL

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Abstract:

Given the growing importance of digital competence and media literacy, Obra Digital in its number 21 aims to address this issue from different approaches and realities in such a way that it presents a contribution that allows us to deepen some areas of this fascinating and changing reality, with special emphasis on education.

KEYWORDS

Digital competence, Media literacy, Online education, ICTs.

Resumen:

Frente a la creciente importancia de las competencias digitales y la alfabetización mediática, Obra Digital en su número 21 pretende abordar el tema desde enfoques y realidades diferentes de tal forma que se en este número se presenta un aporte que permite profundizar algunas áreas de este fascinante y cambiante realidad, con énfasis especial en la educación.

PALABRAS CLAVE

Competencia digital, Alfabetización mediática, Educación en red, TIC..

Resumo

Diante da crescente importância das competências digitais e da alfabetização midiática, a Obra Digital no seu número 21 pretende abordar o tema a partir de diferentes abordagens e realidades de forma que este número apresente contribuições que permitam aprofundar algumas áreas desta fascinante e mutante realidade, com ênfase especial na educação.

PALAVRAS-CHAVE

Competência digital, Alfabetização midiática, Educação em rede, TIC.

Digital competence and media literacy have been gaining importance for some years, as can be seen in numerous studies (Gallardo et al., 2015; Gutiérrez-Martín & Tyner, 2012; Kamerer, 2013; Potter, 1998), many of which were carried out in Latin America (Ferrés Prats et al., 2012; Garro-Rojas, 2020; Mateus et al., 2020; Rivera-Rogel et al., 2017, 2019) and allowed us to have an idea of the existing situation in the region. However, the same technology and its advances, as well as the changes caused by the global health crisis, have highlighted not only the importance that digital competence and media literacy have in different environments, especially the educational one (Pattier, 2021; Thomas & Rogers, 2020; Yan, 2021), but rather, they show the need to improve them in order to have citizens better prepared to face the challenges that current technology and media present.

The approval and/or implementation of clear public policies, as well as investment in equipment and better connectivity are some of the needs identified in some of the studies cited and many others that have been carried out on the subject (Cannon et al., 2020). Teacher training is essential to improve digital competence and media literacy in education systems, as well as to reduce the existing digital gap between teachers and students (Gozálvez Pérez et al., 2014; Prensky & Perry, 2001; Rivera et al., 2016). In addition, a lot of research is still needed in the area (Manca et al., 2021), which is why we make a contribution that allows us to continue deepening the subject. In this way, number 21 of Obra Digital presents various edges and perspectives on digital competence and media literacy for an open and online education, as can be seen in an analysis of the interaction between Brazilian university students from various areas with Zotero and how this tool contributes to their media literacy. It is also

concluded in another article that the influence that the socio-familial profile and the use that compulsory education students give to technology positively influence the development of digital competence in the area of communication.

The conditions of access, resources and training are evidenced in the digital competence of teachers, as analyzed in the existing digital gap in the didactics of basic education teachers in public schools in Chihuahua, Mexico. In this study, traits such as the use of conventional technologies, low access to technologies for academic use and high learning needs were identified, critical factors that affect the digital competence of teachers. While another study carried out in Portugal analyzes the digital competence of university professors and polytechnic institutes, where it is observed that characteristics such as work at the doctoral level, online teaching and the association with polytechnic institutes, are reflected in higher levels of digital competence.

We also present a systematic analysis of the literature on the integration of technology in Portuguese secondary education since the 1970s, in an attempt to understand the introduction of technology to schools in the last 50 years. On the other hand, the digital competence that teachers need is also analyzed, the gap between their professional and pedagogical competence reveals the need for continuous training in that area.

Finally, the miscellany section presents two articles, one on the relationship between environmental activism, lifestyle and personal narratives on Instagram by "eco-influencers" and we close this issue with a review of articles published in the last five years on the role of narrative persuasion in edu-entertainment to improve health in Latin America, a topic that

takes on special importance given the global health crisis.

Thus, number 21 of Obra Digital, corresponding to the months of September 2021 to January 2022, presents eight articles from two continents and six countries (Brazil, Colombia, Ecuador, Spain, Mexico, Portugal). The articles are published in their original versions in Spanish, Portuguese and English, as well as a full version in English. We invite you to enjoy this number.

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I

INTRODUCTION

Digital competences and media literacy for an open and online education

Competencias digitales y alfabetización mediática para una educación abierta y en línea

Competências digitais e alfabetização midiática para uma educação aberta e online

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Abstract:

We live in a society where physical and virtual reality are increasingly intertwined. The boundaries between the body and the imaginary gain new contours and definitions, affecting important and essential aspects, such as the power of participation and emancipation of the individual in the society in which he/she is inserted. The rapid pace of the technological and digital society makes it essential that both teachers and students know how to use different digital resources to create and develop learning environments that lead not only to the acquisition of knowledge, but also to scenarios that promote the development of different learning skills. Recently, the emphasis given to the relevance of digital competence has resulted in the development of various initiatives in Europe aimed at promoting digital and media competence. In addition, evaluating media in a critical and conscious way, developing the skills necessary to participate in an active and informed way in society, is considered today a fundamental competence for an increasingly mediated society and also for an education that increasingly moves in a fluid way between formal and non-formal spaces. To this end, it is necessary to rethink the objectives and methodologies of education, based on a concept of literacy that is continuously evolving, related to the skills needed to read, understand and communicate.

Resumo

Vivemos em uma sociedade onde a realidade física e virtual estão cada vez mais interligadas. As fronteiras entre o corpo e o imaginário ganham novos contornos e definições, afetando aspectos importantes e essenciais, como o poder de participação e emancipação do indivíduo na sociedade em que está inserido. O ritmo acelerado da sociedade tecnológica e digital torna imprescindível que professores e alunos saibam utilizar diferentes recursos digitais para criar e desenvolver ambientes de aprendizagem que conduzam não só à aquisição de conhecimentos, mas também a cenários que promovam o desenvolvimento de diferentes habilidades de aprendizagem. Recentemente, a ênfase dada à relevância das competências digitais resultou no desenvolvimento de várias iniciativas na Europa com o objetivo de promover as competências digitais e mediáticas. Além disso, avaliar os meios de comunicação de forma crítica e consciente, desenvolvendo as competências necessárias para participar de forma ativa e informada na sociedade, é hoje considerada uma competência fundamental para uma sociedade cada vez mais mediada e também para uma educação que se move cada vez mais de forma fluida, entre espaços formais e não formais. Para tanto, é necessário repensar os objetivos e as metodologias de ensino, a partir de um conceito de alfabetização em constante evolução, relacionado às habilidades necessárias para ler, compreender e comunicar.

Resumen:

Vivimos en una sociedad donde la realidad física y virtual están cada vez más entrelazadas. Los límites entre el cuerpo y el imaginario adquieren nuevos contornos y definiciones, afectando aspectos importantes y esenciales, como el poder de participación y emancipación del individuo en la sociedad en la que se inserta. El vertiginoso ritmo de la sociedad tecnológica y digital hace imprescindible que tanto docentes como alumnos sepan utilizar diferentes recursos digitales para crear y desarrollar entornos de aprendizaje que conduzcan no solo a la adquisición de conocimientos, sino también a escenarios que promuevan el desarrollo de diferentes habilidades de aprendizaje. Recientemente, el énfasis dado a la relevancia de la competencia digital ha dado lugar al desarrollo de varias iniciativas en Europa destinadas a promover la competencia digital y mediática. Además, evaluar los medios de comunicación de forma crítica y consciente, desarrollando las habilidades necesarias para participar de forma activa y informada en la sociedad, se considera hoy una competencia fundamental para una sociedad cada vez más mediatizada y también para una educación que se mueve cada vez más de forma fluida. entre espacios formales y no formales. Para ello, es necesario repensar los objetivos y metodologías de la educación, partiendo de un concepto de alfabetización en continua evolución, relacionado con las habilidades necesarias para leer, comprender y comunicarse.

Advances in digital technologies have decisively stimulated learning beyond formal educational structures. Indeed, learning in informal web spaces is now a challenge for the network society, as these environments bring together authentic life and learning experiences, which constitute the core of in-context experiences that feed the knowledge network (Downes, 2006).

Therefore, it is almost consensual that the use of digital media and its tools in educational settings implies more participatory, collaborative and social models centred on the different educational actors. However, change should not be seen only from a technological point of view, but ought to be considered, above all, in terms of mentality and practice. This reality implies a cultural change, as it requires rethinking the roles of teachers and students, and the relationship and the balances existing between them, besides the implications at the level of course and curriculum planning, evaluation systems, ways of teaching and learning. In fact, a school that focuses on learning will be the one that will also make a reflected, critical and thoughtful use of all the resources and all the strategies that digital technology allows. For that to happen, it is also important to understand the different skills that make up the digital and media competences in Education and then seek the adequate training to keep up with the evolution of digital technologies and identify how these can best serve the objectives of each teacher and each student.

In the current European context, "learning to learn" has been effectively considered, in several official documents, a key competence necessary in the knowledge society, implying, on the one hand, that the individual is aware of his/her own learning method and needs, identifying the available opportunities and, on the other hand, that he/she is able to remove the obstacles to successful learning.

To this end, it is necessary to rethink goals and methodologies, based on a concept of literacy that is in continuous evolution, related to the skills needed to read, understand and communicate (Aguaded-Gómez & Pérez-Rodríguez, 2012; Gutiérrez & Tyner, 2012).

This ability to adapt takes on particular importance when recognising the need to keep up with change, know one's digital skills and know also to make effective use of digital tools with a view to social participation, joint work involving communication, critical thinking and problem-solving skills (Cartelli, 2010; Martin & Grudziecki, 2006).

Recently, the emphasis given to the relevance of digital competence, has resulted in the development of several initiatives in Europe aimed at promoting digital and media competence (Vuorikari et al., 2016; Carretero et al., 2017).

With regard to young people, and given the fast pace of technological and digital society, it is essential that they know how to use and evaluate media critically and consciously, developing the necessary skills to participate in an active and informed way in society (Matos, Festas & Seixas, 2016).

The benefits of combining digital and media literacy and the extended approaches developed in media education over many years to cover digital media are highlighted by different authors, such as Buckingham (2009), as a strategy to overcome these risks and reinforce a critical dimension of literacy. International institutions, such as UNESCO and the EU, have also promoted research and intervention in the field of digital and media literacy (EU, 2007; Wilson et al., 2011; UNESCO, 2013) and this international context has led to the development of

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this domain in different countries. For example, in Portugal, several initiatives have been developed, such as the National Education Council (2011) or Portugal INCoDe.2030. Also relevant are the studies carried out in Spain, which led to a definition of a set of dimensions (language processes, technology, production and dissemination, ideology and values, interaction processes and aesthetic dimension) that configure the concept of media literacy competences (Ferrés, 2007; Ferrés & Piscitelli, 2012).

For this reason, it was considered fundamental to promote a space for sharing work that focuses on the development of digital and media skills in the context of an open and networked education, and on the importance of creating educational spaces that favour the development of learning strategies that motivate and provide for the development of different skills by both teachers and students, since they facilitate an interaction between what are their digital social skills and a more active and constructivist attitude with regard to access to knowledge.

Sharing, in the same space, this knowledge is particularly important, especially because it is an opportunity to cross digital skills and media literacy, which, for example, for institutions like the European Union is recognized as one of the most relevant issues for the benefit of education and society and not only in the face of the adversities faced due to the pandemic that the world is experiencing. This recognition assumes a prominent place in the strategic guidelines for Europe and the world for the coming years, making the preparation of a thematic dossier dedicated to "digital and media skills in an open and networked education" of relevance for the international society.

The first article in this dossier, "Technologies and digital literacy", from Beatriz Oliveira de Almeida, Lynn Rosalina Gama Alves and André

Luis Mattedi addresses an experience with Zotero, and aims at analysing forms of interaction between university students with this software, in face of new ways of reading and writing in the contemporary context, concluding from the analysis of their results that these students seem to struggle to become literate in digital environments, especially, as the authors state, those that require prior knowledge of standardization for academic works such as Zotero.

Marcos Cabezas González, Sonia Casillas-Martín and Ana García-Valcárcel Muñoz-Repiso, in their article "Socio-familial and technology use profiles of compulsory education students with a high level of digital competence in the area of communication", evaluate the digital competence in the communication area of Spanish compulsory education students and identify the socio-familial and technology use profiles of those who obtained the best results. The authors identified, from the analysis made, that socio-familial variables and the use of technology positively influence the development of the competence of digital communication.

"Digital divide in the didactics of basic education teachers" is the title of the article written by Javier Tarango, Victoria García-Prieto and Fidel González-Quiñones with the aim of diagnosing the existing distance in the access, use and appropriation of ICT in teachers. The research made allowed the authors to identify some behavioral traits of teachers, such as use focused on conventional technologies, low access for academic purposes and high learning needs through training processes.

Cassio Santos, Neuza Pedro and João Mattar authored the fourth article, regarding "Digital competence of higher education professors". Based on the DigCompEdu framework as a theoretical reference, and a quantitative approach, the authors analysed the differences

associated with the variables of teaching and institutional nature in the level of proficiency of teachers in digital competences. The results show that characteristics such as working at PhD program level, teaching online and being linked to polytechnic institutes are associated with higher levels of digital competence.

"Technology integration in secondary education in Portugal from the 1970s to the present day" is the title of the article written by Sara Dias-Trindade, José António Moreira and António Gomes Ferreira and focuses on a systematic literature review to analyse pedagogical experiences using technology in Portugal, between the 1970s and the present day. The authors conclude that, despite some conservatism in the use of technology, still very focused on its instrumental use, more practices with a pedagogical intent and more focused on the active participation of students have been implemented in recent years.

Closing the thematic dossier, Eniel do Espirito Santo, Tatiana Polliana Pinto de Lima and Adriano Dantas de Oliveira present the readers with a study on "Digital competencies of educators", which also bases its theoretical reference on the DigCompEdu framework and presents the results of the DigCompEdu CheckIn self-assessment scale applied to Brazilian Elementary school teachers. This study showed gaps in the teachers' professional and pedagogical competencies, as well as while developing their students' competencies, and the need for the pedagogical use of technologies as promoters of student learning and emancipation to be included in educator's continuous education.

This edition of *Obra Digital* includes, still, two more articles, that also show the importance of a communication based on or making use of digital environments to enhance practices, strategies and narratives.

The first one, from Elisenda Ardèvol and Sandra Martorell – "Lifestyle, Activism and Consumption in Environmental Influencers on Instagram" – presents part of an ongoing study about the relationship between this activism, lifestyle and personal narratives on Instagram. From the initial results, Ardèvol and Martorell are already able to state that the role of the "eco-influencer" opens up a new form of social activism based on promoting a sustainable lifestyle in which images play a fundamental role.

The second and final article, "The role of narrative persuasion in Edu-Entertainment to improve health in Latin America", from Alicia Camelo, Catalina González-Cabrera and Elizabeth Vargas-Rosero, is a systematic literature review on narrative persuasion research in health communication in Latin America. This research showed that there is still a need to know more on how narratives can influence preventive and risk behaviours in health to try and demonstrate how powerful these strategies are in generating attitudinal and behavioural changes and help those who take decisions in the health area to create public policies based on empirical evidence.

We hope that reading these texts may contribute to broaden knowledge about media and digital competences, but that it may also provide new ideas, new challenges and new research projects that will thus contribute to increase international knowledge in these areas.

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OBRA DIGITAL

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Technologies and digital literacy: an experience with Zotero

Tecnologías y alfabetizaciones digitales: una experiencia con Zotero

Tecnologias e letramentos digitais – uma experiência com o Zotero

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Abstract

New ways of reading and writing appear in the contemporary context for the production of knowledge. This article aims to analyze the forms of interaction between the students of the interdisciplinary degrees of the Federal University of Bahia with Zotero, which contributes to the digital literacy of these students. For this, a qualitative investigation was carried out using a questionnaire and the observation of the participants for the production of data. The research results indicate the difficulty of students to become literate in digital environments, especially those that require prior knowledge of standardization for academic works such as Zotero.

KEYWORDS

Digital Literacy, Bibliographic management, Zotero, Interdisciplinary Baccalaureate.

Resumen

Nuevas modalidades de lectura y escritura son cada vez más solicitadas para la producción de conocimiento en el contexto contemporáneo. Así, este artículo tiene como objetivo analizar las formas de interacción entre los estudiantes de las Licenciaturas Interdisciplinarias de la Universidad Federal de Bahía con Zotero, lo que contribuye a la alfabetización digital de estos estudiantes. Por lo tanto, se realizó una investigación cualitativa mediante un cuestionario y observación participante para la producción de datos. Los resultados de la investigación señalan la dificultad de los estudiantes para alfabetizarse en entornos digitales, especialmente en aquellos que requieren conocimientos previos de normalización que gestionan trabajos académicos como Zotero.

PALABRAS CLAVE

Alfabetización digital, Gestores bibliográficos, Zotero, Licenciatura interdisciplinar.

Resumo

Novas modalidades de leitura e escrita têm se tornado cada vez mais requisitadas para a produção de conhecimento no contexto contemporâneo. Assim, este artigo tem como objetivo analisar as formas de interação dos alunos dos Bacharelados Interdisciplinares da Universidade Federal da Bahia com o Zotero,

que contribui com o letramento digital desses estudantes. Portanto, foi realizada uma pesquisa qualitativa utilizando questionário e observação participante para a produção de dados. Os resultados da pesquisa apontam a dificuldade dos alunos em se tornarem letrados em ambientes digitais, especialmente naqueles que exigem conhecimentos prévios de normatização que gerenciam os trabalhos acadêmicos como o Zotero.

1. INTRODUCTION

The constant expansion of Information and Communication Technologies (ICTs) in all sectors of society is undeniable. This results in an appropriation of increasingly significant spaces in the daily life of society, changing the forms of socially constructed relationship and consequently transforming the way of working, studying, researching and expressing oneself.

Within the universe of digital technologies, the development and expansion of the Internet manifests different demands in the educational field, which poses new institutional challenges, as well as other forms of teaching and learning (Sales & Leal, 2018). Gómez (2015), based on the perspective of Castells (2009), points out that the position of individuals in front of information and knowledge defines their productive, social and cultural potential in the contemporary economy. This results in the direct social exclusion of those who are not able to assign meaning to what is accessed on a network. Therefore, the need to rethink teaching practices through different pedagogical approaches is emphasized, which are more consistent with the exercise of educational practice in the context of cyberculture.

It is also necessary to reflect on the insertion of ICTS in educational settings, in addition to the instrumental conception that places them as mere "tools" that animate traditional teaching and learning processes (Pretto, 2013). It is necessary to understand them as structuring the contexts that permeate contemporary society.

Pretto (2013) analyzes digital technologies and points out that "the use of instrumentality empties these resources of their fundamental characteristics, transforming them only into an animator of the old education that is rapidly dissolving, since the charm of the novelty also ceases to exist" (Pretto, 2013, p. 138). Therefore, they should be considered more than just tools to support teaching. They must be understood as a basis, that is, as part of the learning process to potentiate new ways of acting, thinking and living; constituting as elements that reflect the demands of contemporary society (Bonilla & Pretto, 2015).

Alves (2016), in dialogue with Lévy (2010), argues that the DICT in educational spaces causes search and research to be applied in order to solve problems. For the author, "the [...] presence of digital and telematic technologies in school environments can be a provocative learning space to investigate and seek ways to discover the different problems that arise when we are immersed in the process of building knowledge" (2016, p. 576). Therefore, when ICTs are used in addition to instruments, the ability to search, process and analyze information is promoted to solve problems critically and autonomously.

Therefore, if they are understood as structures of the teaching and learning process, they will be placed in a scenario where effective appro-

priation for the development of new senses and meanings is possible, in a critical and autonomous way. Access, create, produce, interact, publish and share are some actions capable of composing a communication flow that allows any person, anywhere, to participate and work authoritatively through the integration of digital technologies in a structured way (Pretto, 2017). It is changed from a transmission paradigm in which each consumes the content produced by others, even critically, to an authorship paradigm in which these products can be shared, used, remixed and socialized again in a "endless virtuous circle" (Bonilla & Pretto, 2015, p. 500).

In this context, reading and writing take on a new aspect, gaining other dimensions that require skills that differ from traditional techniques. Mishra et al. (2017) indicates that it is necessary to develop the ability to manage the large amount of information available on the Internet in a critical and autonomous way and, for this, the exercise of digital literacy becomes essential (Mishra et al., 2017). According to Santos et al., digital literacy is a concept that integrates other literacies. Therefore:

> It will make sense that digital literacy is seen as the integrating concept of literacies before the great growth of the digital context, whose focus is technical knowledge and the use of applications, as well as other skills that highlight above all the tendency to use social networks and participatory activities and their importance for new forms of communication, expression, coexistence, learning and work. (Santos et al., 2016, p. 03)

Therefore, it is understood that for the promotion of digital literacy skills it is essential that it exists, at the same time, the integrated develo-

pment of skills to interact with DIC in a way that is not limited only to the instrumental actions of the use of technological artifacts. On the contrary, it is necessary to go further and develop a practice that allows to understand and dominate the new spaces created by cyberculture (Azevedo et al., 2018, Chan et al., 2017).

Therefore, the concept refers to the ability to use information resources to read and write in different situations in cyberspace, with an expansion of the range of contact possibilities with reading and writing also in the digital environment (Azevedo et al., 2018). In addition, we understand that the development of digital literacy implies the critical interaction of subjects with digital technologies in favor of appropriating applicability through a series of creative processes that go beyond mere use.

The problem surrounding this research is the fact that, although almost all new students in the university context are familiar with computers, cell phones, mobile devices and their applications, and sometimes make continuous use of these devices in their (CGI.BR, 2019); many of them have not yet incorporated or developed the systematic and competent use of these technologies in their academic tasks. This is mainly due to the fact that books, pencils, pens and paper continue to be predominant in the Brazilian student culture from preschool to university.

This distance between pedagogical practices with digital devices leads us to reflect on how the school, especially the university, has been creating spaces for interaction with ICTs. Increasingly, it depends on higher education institutions to participate in debates and studies that address this issue, with the aim of seeking new forms and educational models that contemplate the integration of digital technologies in favor of the generation of knowledge. The

teacher in this scenario, in addition to being an agent of education, becomes an agent of literacy (Silva, 2017).

This concern arises in view of the large volume of information available on the Internet that these students find when they arrive at the university, either to research, to study topics related to class content, or to prepare academic papers, reports, articles and others. Because of this, it is essential that digital literacy skills and competencies are developed to critically search, access, organize, store, share, and use the accessed information.

The bibliographic reference management software such as Endnote, Mendeley and Zotero, can help in the exercise of digital literacy because they have a series of functionalities and applications that assist in the preparation of academic works from the stages of search, selection, organization, reading and writing; up to the insertion of citations and references.

Aware of these problems, this work aims to analyze the forms of interaction of a group of students of the Interdisciplinary Baccalaureate (BI) of the Federal University of Bahia (UFBA) with the reference manager Zotero, which contributes to the digital literacy of these students. Among the bibliographic managers mentioned, Zotero was chosen because it is a free software (Yamakawa et al., 2014). The results of an ongoing master's research that took place in a graduate program at UFBA will be discussed.

2. DIGITAL LITERACY AND REFERENCE MANAGEMENT SOFTWARE

Literacy goes beyond the practice of decoding linguistic codes, it implies the sociocultural understanding of writing and reading practices (Soares, 2009). Due to the expansion of ICTs in our society, "the [...] concept of literacy, which at first referred only to conventional reading and writing, was extended to other spheres of knowledge construction, including the virtual sphere, giving rise to the expression: digital literacy" (Lima, 2008, p. 4). According to Xavier (2005), being digitally literate implies:

> [...]performing reading and writing practices different from traditional forms of literacy. Being digitally literate presupposes changes in the ways of reading and writing verbal and non-verbal codes and signs, such as images and drawings, compared to the ways of reading and writing made in the book, especially because of the support on which digital texts are based. It is the screen, also digital. (p. 135)

Buzato (2007) states that digital literacy is associated with social practices that are intertwined and modified with digital technologies. For the author, this type of literacy requires skills to construct meanings in different semiotic spheres and the ability to locate, filter and critically evaluate the information provided. Also according to Buzato (2009):

> The new digital literacies are particularly important for thinking about technological appropriation with a view to social transformations, because they allow [...] content sharing instead of private intellectual property, experi-

mentation as opposed to standardization. In short, sharing collaboration, the breaking of creative rules and hybridism rather than the dissemination of content, vigilance and purity. (p. 2)

The concept is still used in its plural form of "digital literacies", as previously stated by Buzato (2009), highlighting its non-generic nature that begins to assume and recognize social practices as structuring of its process (Gachago et al. 2014; Gourlay, 2015). In this sense, Roche (2017) emphasizes that digital literacy is the ability to access, critically evaluate, use and create information. These actions are carried out through commitment to individuals and communities.

Suguimoto et al. (2017) problematized this concept in an evaluation with students who entered higher education. The authors carried out a quantitative investigation through a questionnaire with 12 questions that highlighted aspects of computational, communicational and informational knowledge. The authors argue that the phenomenon of digital literacy must be understood beyond the possession of new technologies for reading and writing, but rather as the assumption by the subjects of a position towards the world. That is, in addition to use, the authors point out that being digitally literate includes the need to learn to search for sources available on the Internet, as well as to read, interpret, evaluate, analyze, investigate, add and recombine information and knowledge available in these sources, in a critical way.

From the concepts presented, we understand that digital literacy refers to the skills to search, select, store, systematize, mix[1] and share information in digital environments and make critical use of these productions in social and discursive practices. This includes contemporary mediation using digital network technologies (Dudeney et al., 2016; Coscarelli & Coiro, 2014). In this sense, interaction with bibliographic managers can contribute to the expansion of these skills by promoting the optimization of the preparation of bibliographic citations and references in accordance with technical standards. In addition, they allow to systematize and manage the selection of primary studies for the composition of academic works, which makes them facilitators of the content production process.

For Pampel and Dallmier-Tiessen (2014), a reference management system is software with a set of characteristics that maintains a database to help in the three basic steps of a search: search, store and write. In addition to organizing, this software allows the user to generate citations and references throughout the writing of the texts, identify duplicate references, select publication periods, recognize the languages of the publications, identify the most cited works, determine the authors who write the most on a given topic and the magazines with the highest number of publications on a certain topic. This type of software allows you to create groups to share, which promotes collaborative production and facilitates the formatting process at the end of the job.

There are several factors that influence the choice of a reference manager that meets the

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1 For Pretto (2017), the action of remixing refers to the act of recreating from pre-existing materials and information available on the web. The author also highlights the importance of this action being seen as one of the pillars of support for educational processes, so that students become authors, freelancers and producers of content in an "endless virtuous circle" (Bonilla & Pretto , 2015 p. 500).

demands of each user. Yamakawa et al. (2014) analyzed and highlighted the main advantages of Mendeley, EndNote and Zotero; and highlighted the difficulties identified in the use of each of them. This research was carried out comparing the use of computer programs, describing some steps used during the search and the bibliographic organization.

Based on the results of Yamakawa et al. (2014), this research chose the bibliographic manager Zotero to implement this platform for the development of digital literacy of BI students at UFBA. Zotero was chosen because it is a free software capable of optimizing scientific work. It allows the user to collect, organize, cite and share information of the most diverse types, including articles, books, chapters, theses, among others. In addition to these characteristics, our choice of Zotero is justified because it allows the construction of exchange groups with a large number of people, promoting the interaction of all participating subjects (Yamakawa et al., 2014).

Zotero can be used through an extension installed in the Firefox (free browser), Chrome or Safari web browsers, or through its desktop version compatible with Windows, Macintosh and Linux distributions. This allows to import files and references from the computer itself. The software also offers more than 8,000 bibliographic and reference format styles (ABNT, APA, Vancouver, Chicago, among others) that can be integrated with the text editors Microsoft Word, LibreOffice, OpenOffice, Latex, Google Docs and NeoOffice, facilitating the insertion of citations and the generation of bibliographic references. In addition, Zotero allows the free, public or private, exchange of libraries with an unlimited number of participants, as long as they are gathered in groups.

This software supports various databases such as Web of Science, SciElo, Google Scholar, and PubMed, as well as university journals and collections. This allows to export elements in different formats such as BibTex, CSL JSON, RIS, RefWork among others. This compatibility makes it possible to use file metadata to automatically import bibliographic information such as author, title, periodical publication and volume, optimizing manual work and increasing the quality of this type of process. It is also possible to highlight and annotate PDF files through the platform, which allows the creation of files in a simple, fast and systematic way. These files can be exchanged during the writing of new works, either to make a direct or indirect citation or to consult points considered important.

Faced with our research problem, the challenge was to motivate university students to practice digital reading, writing, and instrumentalization, so that they could appropriate the characteristics of Zotero and socialize texts through the creation of networks of exchange. It is intended to subsidize the production of other articles and projects, contributing to continuous and autonomous learning and the production of new collaborative knowledge. This allows the development of skills and competences that provide autonomy for learning and insertion in the contemporary world.

3. METHODOLOGY

We sought to structure our research process through a qualitative exploratory methodological approach. The empirical space of the research was the BI of UFBA.

The BIs are a type of university course aimed at general, artistic, scientific and humanistic university education. BI were conceived as the first cycle of a training regime, a prerequisite for

a second cycle for professional training or for a stricto sensu postgraduate program (UFBA, 2008; UFBA 2010a; UFBA 2010b; UFBA 2010c; UFBA 2010d). This modality is offered in four courses at UFBA: BI in Arts; BI in Science and Technology; BI in Humanities and BI in Health. The BI project involves some curricular innovations, such as intra-institutional and inter-institutional mobility interdisciplinarity, flexibility, comprehensiveness, modularity and progressivity.

The IB subjects participating were Arts, Science and Technology, Health and Humanities with 11 students. These were enrolled in Contemporary Studies I, in the first semester of 2019. Regarding the fundamental ethical aspects for the execution of an investigation, the participants signed a free and informed consent (ICF) on the registration of their knowledge, the purpose and the details of the investigation, guaranteeing their anonymity and responses.

The data production instruments used in this research were participant observation and a questionnaire. The first instrument was used to stimulate constant reflection throughout the research process, based on the demands and needs encountered along the way. This instrument proposes that the observer actively participate in data production activities and requires the aptitude of the researcher to adapt to different situations (Pawlowski et al., 2016). The observation of the participants took place throughout the intervention using a script developed based on the theoretical foundations adopted in this study. It sought to document the digital literacy practices that emerged during the interaction.

The questionnaire was applied using Google Forms and its objective was to help understand the profile of the participants, favoring the impartiality of the observation and specifically identifying the types of interaction between the participants and the reference management software.

3.1 STAGES OF THE RESEARCH

The first stage of the research was the transversal implementation of Zotero to the pedagogical practice of a BI group at UFBA in 2019. Due to the structural limitations of the institute, the computer lab was not available for the direct interaction of participants with the software. For this reason, the management software functionalities were presented through a participatory exhibition in which the main applications were highlighted with practical examples. The participants were asked to install the bibliographic manager on their personal computers. In the same meeting, a virtual library was created and shared with the class, along with the bibliography that would be used throughout the study. It included articles, book chapters, videos, blog texts and other digital materials.

Among the proposed activities, each participant must individually produce an academic document written in an argumentative essay format. Therefore, the second stage of the research consisted of observing and monitoring the written productions of the students, seeking to identify how they interacted with the software. At this stage, an online exploratory questionnaire with introductory questions about the interaction of these subjects with Zotero was applied to track digital literacy indicators in parallel with the observations made.

3.2 ANALYSIS OF DATA

The records of the observation script and the questionnaire were analyzed based on the works of Rosa (2013), Rosa and Dias (2012) and Dias and Novais (2009), where the authors present a proposed matrix with the description

of skills and competences needed to read and write in digital environments.

According to Dias and Novais (2009), for the field of education, a skills matrix is a "list of skills and competencies that an individual needs to solve a problem, generally organized by area of knowledge" (Dias & Novais, 2009, p.2). In this sense, the authors point out four great actions of competent users in digital environments as "the main skills that a user must develop to improve their digital literacies, regardless of the nature of their practices" (Dias & Novais, 2009, p. 7). These are: using different interfaces; search and organize information on a network; read digital hypertext and produce texts (oral or written) in cyberspace.

Rosa (2013) and Rosa and Dias (2012) extend this discussion by building a matrix based on two dimensions:

1. Technical-operational skills in ICTs, which refer to the use of computer peripherals and include the identification of icons and features. Turns the computer on and off, recognizes and identifies icons and nomenclatures representing online and offline programs and applications. That is, the recognition of hardware, online and offline graphical interfaces and computer operating processes (Rosa, 2013; Rosa & Dias, 2012).

2. Information skills in ICTs, which refer to the ability to select, collect, organize, cite and share the information that is sought and produced in a virtual environment. Understands copyright rules, using them in the production and remixing of digital texts. Evaluates the information in terms of validity and security (Rosa, 2013; Rosa & Dias, 2012).

Going from the general to the specific scope and with respect to the technical-operational dimension in ICTs, the initial contact with Zotero can promote practices that involve both the recognition of the main icons and software plugins associated with each functionality. It also encourages the ability to navigate the interfaces, identify download icons and record the different ways of organizing personal libraries in Zotero.

In the informational dimension, Zotero can optimize the processes of search, selection, organization and storage of the large amount of information available on the Internet, since it is compatible with various databases and institutional repositories.

Zotero allows you to manage your collection and automate the generation of citations and references, along with the creation of shared libraries in which users can socialize their stored texts through the creation of shared networks and dialogue with their peers. This promotes the production of other content and creates work networks, building knowledge cooperatively and collaboratively from these interactions.

Consequently, it is clear that a digitally literate individual understands himself within a broader context, appropriating digital technologies through a series of creative processes that go beyond mere use; they become critical in the construction of knowledge. From the concepts presented, the results of this research were analyzed considering digital literacy skills in the technical-operational and informational dimensions (Rosa, 2013; Rosa & Dias, 2012).

4. RESULTS AND DISCUSSION

Based on the perspective that "the degree of digital literacy of the subject grows as the mastery of the technological devices that it uses in its daily actions increases" (Xavier, 2011, p.6), we seek to create an environment where university students can implement the different Zotero applications in their daily academic practices. This seeks the development of skills and competencies in: reading and writing on digital devices; search, process, organize and critically evaluate the vast amount of information available on the web; systematize the process of citations and bibliographic references according to normative standards and share their work digitally with the support of the software. Among other actions that could arise from the interaction, they become digitally literate in Zotero (Souza, 2016; Santos, 2016; Buzato, 2009).

The profile of each of the 11 volunteer research participants was identified through the questionnaire distributed among the IB courses in Humanities, Health, and Science and Technology. It is worth mentioning that there was no participation from the Arts students.

Regarding the resources used to read the texts of the topics, 8 respondents reported using their personal computers. This confirms that most of the participants are already immersed in the digital world. It should be noted that, although digital texts were used and the files were made available in the shared Zotero library, 4 participants used printed books (paper) to read.

This shows the resistance of this group to give space to digital reading and writing practices and their applications, mainly in word processors (Microsoft Word, Libreoffice Writer) and PDF readers/editors (Adobe, Preview, Foxit,

Master). This occurs mainly because books, pencils, pens and paper continue to be the predominant in the Brazilian pre-university school culture.

In addition, 100% of the respondents revealed that they did not know about Zotero. Among the hypotheses that can justify this fact, two stand out: the absence of discussions about the functionalities and potential of the reference managers in the classroom and in pedagogical practices; and the possibility of not including students in research contexts or scientific initiation, which require greater attention to academic writing.

According to Xavier (2005) and Azevedo et al. (2018), the acquisition and development of skills and competencies require time and dedication. Therefore, the appropriation of the functionalities of the reference manager may have become a more complex process, considering that the school term is only four months long and that the students had no previous contact with Zotero.

From this aspect, crucial points were observed. In the first meeting, even after the participatory presentation of the software, 5 of the 11 respondents asked about the real usefulness of Zotero and why we chose to attach the files by this means instead of simply attaching it to the Moodle section of the subject. They still treated Moodle as a repository, leaving aside the functionality of the bibliographic manager and reducing its applicability in an instrumental perspective.

Given the context of cyberculture, it is urgent that teachers, as mediators of the interaction process with ICTs, are prepared to take a critical position in the face of these questions and manifestations. They should try to fill these

gaps through pedagogical practices that promote critical reflection on the use of digital technologies as well as simple tools, repositories, instruments or resources for the pedagogical support of a traditional academic activity (Canto, 2019).

Although some testimonials revealed some resistance to the implementation of Zotero in the proposed activities, 100% of the participants said that they accessed the shared library in the software to download the bibliography files for the course. These actions are associated with technical-operational skills (Rosa, 2013; Rosa & Dias, 2012), which include the use and recognition of the interface and the functionalities present in the initial contact with the bibliographic manager.

Of the 11 students surveyed, 7 revealed that they did not organize their personal libraries-through Zotero. Of these, 6 justified that they did not do it due to lack of time. However, we must highlight the justification of the seventh participant: "I prefer to organize my content in Google Drive". This evidence reveals the existence of a gap between the perception of the different functions of each application, since Google Drive is a cloud for storing and synchronizing files. Zotero, on the other hand, is a bibliographic manager capable of optimizing scientific work, allowing the user to collect, organize, cite and share information of the most diverse types; including articles, books, chapters, theses and other types of documents that digital libraries make available.

In addition, 9 of the 11 participants said that they used Zotero to systematize the bibliographic references. This statement is counteracted by important data obtained through the correction and analysis of written works, 6 of them were not in line with the standards of the Brazilian Association of Technical Standards (ABNT). According to Xavier (2005), being a digital literate presupposes changes in the ways of reading and writing through mediation with digital technologies. The lack of organization of the library, as well as the errors evidenced in the written works, indicate that these students did not appropriate the environment and did not optimize the work of citations and references through the software.

This result indicates that 3 of the 11 students who participated in the research developed informational skills in digital literacy that include the recognition, search, access and retrieval of information available on the Internet with critical importance regarding the quality and reliability of the content (Warschauer, 2006); in addition to the skills to synthesize, produce, remix, share their productions and dialogue with their colleagues through Zotero.

This contrast identified between the observation of the written works and the data of the questionnaire shows a certain inconsistency that can be justified by the apprehension that the participants feel of being in a critical position, fearing that revealing their opinions will affect their evaluations of the subject. Other possible reasons may explain the identified controversy: the participants may not have understood the full potential of Zotero, the contact time with the bibliographic manager may not have been long enough for people to learn to use it in its entirety, and the tendency where research participants answer questions with the intention of pleasing the researcher.

5. CONCLUSIONS

The results indicated the difficulty of the participants to become literate in digital environments, especially those that require prior knowledge of standardization such as ABNT. Because of this, they were reluctant to use the Zotero bibliographic manager. Some preferred to search the bibliographic material on the Internet without making use of the class group in the shared library, while others did not install the software on their own computers and chose to use the web version that does not have most of the features. In addition, it was possible to verify that the Zotero functionalities were not used to make citations and references when correcting the written productions of these participants.

It is worth mentioning that the intervention was not carried out in the institute's computer lab due to the lack of physical space during class hours. The interaction with the software in the classroom was limited to participatory exhibitions. This may have been one of the main factors that hindered the appropriation of the Zotero functionalities and, consequently, the development of some digital literacy skills, since there was no mediation by the teacher throughout the process. This forced participants to interact with the software outside of the classroom, demanding more autonomy on their part.

It is concluded that the evolutionary process observed is still embryonic, since the acquisition of skills for digital literacy does not occur immediately and simply. In addition, the need to strengthen these practices to consolidate skills was identified. Therefore, this study supported the proposal of an extension course entitled "Digital reading and writing with the mediation of Zotero" in which the questions posed in this article and others that arose during the course were recovered.

The creation of this course was based on the assumption that the participants will be immersed in an environment that promotes the development of skills and competencies to read and write digitally from direct contact with the software and the mediation of a teacher. The proposal of the course is that students are not only literate, but also critical, autonomous and digitally literate, essential characteristics for insertion in contemporary society structured by ICTs.

Technologies and digital literacy: an experience with Zotero

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Socio-familial and technology use profiles of compulsory education students with a high level of digital competence in the area of communication

Perfil sociofamiliar y de uso de tecnología de estudiantes de Educación Obligatoria con nivel alto de competencia digital en el área de comunicación

Perfil sociofamiliar e uso de tecnologia de alunos do ensino obrigatório com alto nível de competência digital na área de comunicação

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Abstract

This study aims to evaluate the digital competence in the communication area of Spanish compulsory education students and identify the socio-familial and technology use profiles of those who obtained the best results. The methodology used was quantitative with a sample of 807 students. The instruments used were an objective evaluation test and a Likert scale (ECODIES), based on the DigComp model. The study of the profiles of those with the best competence level in digital communication allowed us to conclude that socio-familial variables and the use of technology positively influence the development of this competence.

KEYWORDS

Digital competence, ICT, Competence assessment, Digital communication, Compulsory Education.

Resumen

Con este estudio se pretende evaluar la competencia digital, en el área de comunicación, de los estudiantes españoles de Educación Obligatoria e identificar el perfil sociofamiliar y de uso de tecnología de los que obtienen los mejores resultados. La metodología empleada fue cuantitativa y se trabajó con una muestra de 807 estudiantes. Los instrumentos utilizados fueron una prueba objetiva de evaluación y una escala Likert (ECODIES), basadas en el modelo DigComp. El estudio del perfil de aquellos con mejor nivel competencial en comunicación digital permite concluir que las variables sociofamiliares y de uso de la tecnología influyen positivamente en el desarrollo de esta competencia.

PALABRAS CLAVE

Competencia digital, TIC, Evaluación de competencias, Comunicación digital, Educación Obligatoria.

Resumo

Este estudo tem como objetivo avaliar a competência digital, na área da comunicação, dos alunos espanhóis do ensino obrigatório e identificar o perfil sociofamiliar e do uso de tecnologia daqueles que obtêm os melhores resultados. A metodologia utilizada foi quantitativa e trabalhamos com uma amostra de 807 alunos. Os instrumentos utilizados foram um teste de avaliação objetivo e uma escala Likert (ECODIES), baseada no modelo DigComp. O estudo do perfil daqueles com melhor nível de competência em comunicação digital permite concluir que as variáveis sociofamiliares e do uso da tecnologia influenciam positivamente no desenvolvimento desta competência.

PALAVRAS-CHAVE

Competência digital, TIC, Avaliação de competências, Comunicação digital, Educação obrigatória.

1. INTRODUCTION

The Knowledge Society, a concept in which the various transformations that have occurred in today's modern society are justified (Castells, 2004), is characterized by being complex and changing (Farré Riera, 2020) and is the result of profound social, economic and cultural changes fostered by the rapid development and growth of Information and Communication Technologies (ICT) (Casillas-Martín & Cabezas-González, 2019; Sánchez-Caballé et al., 2020).

Although technology is integrated into the lives of students (Valverde Crespo et al., 2018), they need to acquire knowledge, skills and develop

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attitudes that allow them to adapt to a new type of individual-information and individual-knowledge relationships (Casillas- Martín et al., 2020). For this, digital competence becomes one of the most demanded and important because it is key in the treatment of information and academic performance (Pagani et al., 2016; Siddiq et al., 2016). In this sense, European policies promote it as one of the primordial capacities of this century, in addition to considering ICTs as fundamental means to favor learning opportunities and social cohesion (Pérez Martínez & Hernández-Gil, 2020).

Digital competence has become a focus of interest in the educational policies of different countries (Cabero-Almenara & Palacios Rodríguez, 2020). In Europe, it is considered one of the eight key competences for lifelong learning and is defined as:

> The safe, critical and responsible use of digital technologies for learning, at work and for participation in society, as well as interaction with them. Includes information and data literacy, communication, media literacy, digital content creation (including programming), security (including digital well-being and cybersecurity-related competencies), intellectual property issues, problem solving and critical thinking. (European Union, 2018, p.9)

There are different standards, understood as theoretical reference constructs that are useful to carry out actions in a given environment (UNESCO, 2008), for the acquisition, development and evaluation of this competence. At the European level, the DigComp project, aimed at the identification and validation at European level of the key components of digital competence, has become a benchmark for the deve-

lopment of the European framework for digital competence.

In 2013, the European Commission published the Framework for Developing and Understanding Digital Competence in Europe (DigComp 1.0) (Ferrari, 2013). This model structured the dimensions of digital competence in five areas (information, communication, content creation, security, problem solving), three levels (basic, intermediate, advanced) and three fields (knowledge, skills and attitudes). In 2016, it was updated by the European Digital Competence Framework for Citizens (DigComp 2.0) (Vuorikari et al., 2016). The same structure of the previous model was maintained but the denominations, concepts and descriptors of digital competence were updated. In 2017, the latest update occurred and DigComp 2.1 emerged (Carretero et al., 2017). The main change occurred in the difficulty levels that went from three to eight, following Bloom's taxonomy and inspired by the structure and vocabulary of the European Qualifications Framework (EQF, for its acronym in English) (Figure 1).

Figure 1

Digital competence structure of DigComp 2.1.

Source: Carretero et al., 2017.

In the work presented in this article, the Dig-Comp 1.0 Framework (Ferrari, 2013) was followed, as it is the original model and is more suited to the object of study of this research. The study focused on the competence area called communication, which encompasses a total of six digital competences (Figure 2) related to: communicating in digital environments, sharing resources through online tools, linking with others and collaborating through digital tools, interact and participate in communities and networks, and intercultural awareness. This area is transversal in nature and can be applied to any type of activity carried out in digital media.

Figure 2

Digital competences in the comm unication area of DigComp 1.0.

Source: Ferrari, 2013.

This article presents a work carried out within the framework of an R&D research project financed by the Ministry of Economy and Competitiveness within the State Program for the Promotion of Scientific and Technical Research of Excellence of the government of Spain, whose purpose is the to evaluate the digital competence of Compulsory Education students and analyze the relationships and incidence established between their level of digital competence and some socio-familial characteristics (variables).

2. METHODOLOGY

A quantitative methodology was used with a descriptive and cross-sectional design.

2.1. OBJECTIVES

The objectives to be achieved are:

1. Determine the level of digital competence in the area of communication that Spanish Compulsory Education students (12 to 16 years old) have, considering their knowledge, skills and attitudes.

2. Identify the socio-familial profile and use of technology of those who obtain better results in the evaluation of this area of digital competence.

2.2. SAMPLE

The research was carried out in two provinces of the Autonomous Community of Castile and León (Spain). A type of stratified random sampling was used (Casal & Mateu, 2003), with a margin of error of +4% for a confidence level of 95%, which led to working with a sample of 807 students (668 from the last year of Primary Education and 139 from the first year of Compulsory Secondary Education) between 12 and 16 years old, from 18 educational centers (Table 1). From the gender point of view, there is a balanced sample (415 women and 392 men).

Table 1

Sample distribution

Total sample	Year				Gender			
	Sixth grade		Seventh grade		Female		Male	
N	N	%	N	%	N	%	N	%
807	668	82.8	139	17.2	415	51.4	392	48.6

2.3 VARIABLES

The study variables are related, on the one hand, to digital competence:

· Interaction through technologies (C1). Valued through 3 items. The range of the variable is 0-3.

· Share information and content (C2). Valued through 3 items. The range of the variable is 0-3.

· Citizen participation online (C3). Valued through 3 items. The range of the variable is 0-3.

· Collaboration through digital channels (C4). Valued through 3 items. The range of the variable is 0-3.

· Netiquette (C5). Valued through 3 items. The range of the variable is 0-3.

· Digital Identity Management (C6). Valued through 3 items. The range of the variable is 0-3.

· Attitudes (AC). Valued with 6 items on a Likert-type attitudinal scale with responses from 1 to 5. For the analyzes, the score has been recoded, transforming it into a 4-point scale so that it can be compared with the dimensions of knowledge and ability.

· Total score for the communication area (PT). It has been calculated by adding the skills of

knowledge and ability (18 items) and attitudes (6 items).

On the other hand, there are variables related to the family and school context of the participants, as well as the number of devices in their homes and the use they make of them:

· Coexistence with classmates at the school.

· Structure of the family nucleus.

· Leisure preferences in their spare time.

· Reading books that are not for homework.

· Digital devices they have in their homes.

· Frequency of use of digital devices at home on weekdays and on weekends.

· Weekly frequency of activities with the digital devices they have at home.

· Frequency of use of digital devices (computer, tablet or mobile) to carry out school activities outside the educational center.

2.4 DATA COLLECTION INSTRUMENT

An item bank was designed for the communication area considering the indicator model to evaluate the digital competence of Basic Education students (INCODIES) previously designed and validated (García Valcárcel et al., 2020), in addition to the criteria for the elaboration of information collection instruments (McMillan & Schumacher, 2005). To assess knowledge and skills, an objective test was used with 18 questions that presented situations in which students had to make decisions by selecting a correct answer from four possible options. To assess attitudes, a 5-point Likert-type scale composed of 6 statements referring to the area of competence was selected. In order to collect information on the socio-familial context and

the use of technology, a questionnaire made up of 17 items was elaborated.

All the evaluation tests were validated by experts (10 members of the research team) and applied to a pilot sample of 288 compulsory education students. To verify the reliability of the competency assessment instrument and internal consistency, Cronbach's α statistic was used for all items (knowledge, skills and attitude), obtaining a score of 0.70, which is appropriate given the broad spectrum of competencies. With the results obtained, the definitive test was designed (can be consulted in García Valcárcel et al., 2019a) (Table 2).

Table 2

Structure of the digital competence assessment test in the area of communication

Area	Number of items per dimension			Number of items per dimension		
	Knowledge	Skill	Attitude	Basic	Intermediat	Advance
A2. Comunicatin	8	10	6	7	8	3

The test was applied through a website designed to facilitate the collection of information (it can be consulted at https://www.ecodies.es/) and it had the permits of the authorities of the Educational Administration and of the Ethical Committee of the University of Salamanca at all times. All educational centers collaborated voluntarily and were in charge of obtaining the permits of the families and children. Also, they carried out the test during school hours, following the guidelines and protocols prepared by the researchers.

2.5 DATA ANALYSIS

For the analysis of the evaluation of the level of digital competence in the area of communication, the items were grouped into six competences (C1 to C6), created from the sum of the scores of the three items that measure it, in addition to the attitude scale and total score. The statistics of the mean, standard deviation, skewness and kurtosis were calculated.

For the identification of the socio-familial profile and the use of technology, the students who reached a high level in this area of competence were selected. For this, a cut-off score of 14 points was used on a scale of 18 points. If this scale is transformed to a 10-point scale, which is the most used in the student academic evaluation of Compulsory Education in Spain, 14 points correspond to a remarkable high. To identify this profile, basic descriptive statistics were calculated.

The SPSS v.25 program was used for data analysis.

3. RESULTS

The main results obtained are presented below, structured in two sections referring to the level of digital competence and the socio-familial profile and the use of digital devices.

3.1. LEVEL OF DIGITAL COMPETENCE IN THE COMMUNICATION AREA

The results of the mean, standard deviation, skewness and kurtosis of all the students that made up the sample are presented (Table 3). As the knowledge and skills items are dichotomous (correct 1/incorrect 0), the maximum score obtained in the average score of each item will be 1. Regarding the competences

(each one is measured with 3 items), the maximum score will be 3.

Table 3

*Descriptive analysis of the test competences
in the communication area*

Competences in the area of communication	N	DT	Skew-ness	Kur-tosis
C.1. Interaction through technologies	807	2.29	0.79	-0.32	-0.25
C.2. Share information and content	807	1.95	0.78	0.06	-0.40
C.3. Citizen participation online	807	2.09	0.95	-0.07	-0.91
C.4. Collaboration through digital channels	807	1.71	0.93	0.22	-0.83
C.5. Netiquette	807	2.59	0.96	-0.52	-0.72
C.6. Digital Identity Management	807	2.25	0.91	-0.21	-0.77
Total knowledge and skills (max. 18 points)	807	10.23	2.99	-0.35	-0.10
AC. Attitudes (max. 30 points)	807	26.02	4.32	-2.39	9.06

Note: The range of the average score in each competence is from 0 to 3

The total average score in the complete knowledge and skills test is 10.23 points out of 18, above the central point (9) of the scale. These students passed the approved in the area of communication. Average scores range from 1.71 (C4) to 2.59 (C5), which indicates that students have greater knowledge and skills, firstly about netiquette and secondly, about interaction through digital technology; followed by digital identity management, citizen participation online, information and content sharing. They show less knowledge and skills about collaboration through digital channels. Regarding kurtosis, all the competences have scores below 3 and, in all cases, negative, so they can be considered platykurtic distributions.

Regarding attitude (AC), the assessment is very positive in the area of communication (= 26.02; out of 30 points). This variable has a high skewness (>-1) and a kurtosis greater than 3 and positive, so it can be considered as leptokurtic (Table 3).

In order to be able to compare the three dimensions, the scores were converted to a 4-point scale. Thus, knowledge and skills are at a central point, both with very similar scores; while attitude presents a much higher score, with an average of 3.47 (Figure 3).

Figure 3

*Average score for
the dimensions of knowledge, skills and attitude*

	Knowledge	Skills	Attitude
	2,13	2,16	3,47
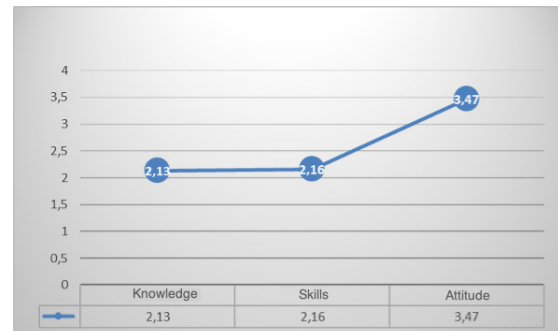
3.2. SOCIO-FAMILIAL PROFILE AND THE USE OF DIGITAL DEVICES OF STUDENTS WITH A HIGH LEVEL OF DIGITAL COMPETENCE IN THE COMMUNICATION AREA

The results presented below correspond to the 26 selected students who obtained the best results in the evaluation test and who constitute 3% of the total sample (Table 4).

Table 4

Students with the best level of competence by year and gender

Total sample	Year				Gender			
	Sixth grade		Seventh grade		Female		Male	
N	N	%	N	%	N	%	N	%
26	16	61.5	10	38.5	11	42.3	15	57.7

Table 6

Structure of the family nucleus

Sample	Mother	Father	Siblings	Grandmother	Grandfather	Other relatives
N	%	%	%	%	%	%
26	100	84.6	69.2	3.8	0	0

3.2.1. SOCIO-FAMILIAL PROFILE

Regarding coexistence with classmates at school, 22 (84.6%) consider that they have no problems relating to their classmates at school, although 4 (15.4%) state that they have felt, at some point, not having friends to play with at recess (Table 5).

Table 5

Coexistence with classmates at the school

Total sample	Do you have friends to play at recess?							
	Never		Sometimes		Most of the time		Always	
N	N	%	N	%	N	%	N	%
26	0	0	2	7.7	2	7.7	22	84.6

Regarding the structure of the family nucleus, the majority live with their parents and siblings. They all live with the mother; only 4 (15.4%) do not live with the father and 1 (3.8%) also live with the grandmother. In addition, 69.2% have siblings, compared to 30.8% who are only children (Table 6).

If we take into account their leisure preferences, what they like the most are family activities (53.8%), playing outdoors (34.6%), sports (38.5%) or reading a book (42.3%). They like less to watch television (26.9%), play individually or in groups on the console / computer / tablet (23.05%), and go to the movies (19.2%) (Table 7). It is interesting to note that a very high percentage (84.6%) are reading a book not related to any school task.

Table 7

Leisure preferences in their free time

Sample	AF	TV	JAL	Dep	L	Jd-Tec	C
N	%	%	%	%	%	%	%
26	53.8	26.9	34.6	38.5	42.3	23.05	19.2

Note: AF (Family Activity). TV (Watch TV). JAL (Play outdoors). Dep (Sport). L (Read books). JdTec (Play individually or in groups with technological devices). C (Go to the cinema).

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3.2.2. PROFILE OF USE OF TECHNOLOGICAL DEVICES

The number of digital devices available at home is very high (Table 8). Everyone owns a desktop or laptop computer, many have a music player (96.2%), a game console (88.5%), a tablet (84.6%) and a printer (76.9%).

Table 8

Digital devices they have at home

Sam-ple	O	T	RMP	MCI	Imp	Eb	Vc	TV	CP
N	%	%	%	%	%	%	%	%	%
26	100	84.6	96.2	50	76.9	26.9	88.5	100	50

Note: O (Computer). T (Tablet). RMP (Portable Music Player). MCI (Mobile with Internet connection). Imp (Printer). Eb (Ebook). Vc (Game console). TV (Television). CP (Paid television services).

If we take into account the frequency during the week with which they use the devices they have at home (Table 9), more than half (61.5%) watch television almost every day, 50% never use the tablet, 34.6% use the computer one day, 26.9% use the mobile phone every day, and 19.2% use a game console between two and three days a week.

Table 9

Frequency with which they use digital devices at home on weekdays

Devi-ces	Never		1 day		2-3 days		4-5 days	
	N	%	N	%	N	%	N	%
Mobile phone	8	30.8	2	7.7	5	19.2	7	26.9
Tablet	13	50	6	23.1	2	7.7	5	19.2
Com-puter	2	7.7	9	34.6	8	30.8	5	19.2
Game console	9	34.6	5	19.2	3	19.2	3	11.5
Televi-sion	0	0	1	3.8	5	19.2	16	61.5

Focusing on the frequency with which they use digital devices during the weekend (Table 10), 42.3% watch television between three and four hours. Between one and two hours, 53.8% use the tablet, 46.2% use the computer and 34.6% play with the game console. 34.6% never use the mobile phone during the weekend.

Table 10

Frequency with which they use digital devices at home during the weekend

Devices	Never		1-2 hours		3-4 hours		5-6 hours		7-8 hours		+ 8 hours	
	N	%	N	%	N	%	N	%	N	%	N	%
Mobile pone	9	34.6	7	26.9	5	19.2	3	11.5	1	3.8	0	0
Tablet	10	38.5	14	53.8	2	7.7	0	0	0	0	0	0
Computer	8	30.8	12	46.2	4	15.4	0	0	0	0	1	3.8
Game console	7	26.9	9	34.6	3	11.5	1	3.8	1	3.8	3	11.5
Television	1	3.8	10	38.5	11	42.3	0	0	1	3.8	3	11.5

Regarding the weekly frequency with which they carry out activities with the digital devices they have at home (Table 11), they never chat online with friends (26.6%) or with strangers (92.3%), nor do they use social networks (57.7%), take photos or record videos to share (57.7%). Between one and two days they play video games (42.3%) and watch series and movies (34.6%). Between three and four days they look for information on the Internet (42.3%) and every day of the week they watch YouTube videos (38.5%) and listen to music (50%).

Table 11

Weekly frequency with which they carry out activities with the digital devices they have at home

Activities	Never		1-2 days		3-4 days		5-6 days		Every day	
	N	%	N	%	N	%	N	%	N	%
Chat online with friends	7	26.6	4	15.4	6	23.1	1	3.8	8	30.8
Chat online with strangers	24	92.3	1	3.8	0	0	1	3.8	0	0
Watch videos (Youtube)	1	3.8	6	23.1	5	19.2	4	15.4	10	38.5
Listen to music	2	7.7	5	19.2	1	3.8	5	19.2	13	50
Play video games	5	19.2	11	42.3	5	19.2	1	3.8	3	11.5
Look for information on the Internet	4	15.4	5	19.2	11	42.3	4	15.4	2	7.7
Use social networks	15	57.7	4	15.4	3	11.5	1	3.8	3	11.5
Watch series and movies	4	15.4	9	34.6	5	19.2	4	15.4	4	15.4
Take photos or record videos to share	15	57.7	9	34.6	0	0	2	7.7	0	0

Finally, if we focus on the use of these digital devices to carry out school activities outside of school (Table 12), very few times they look for information on the Internet to do their homework (38.5%), they access information from the classroom or the center and deliver their assignments through blogs, platforms or web pages (46.2% and 50% respectively), use simu-lations or video games to learn (38.5%), perform exercises (46.2%), create videos (50%), make presentations (42.3 %), and use online messaging to communicate with other classmates or with teachers about schoolwork (30.8% and 42.3% respectively). They frequently carry out evaluations or review exercises on the topics studied (42.3%).

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Table 12

Frequency with which they use digital devices to carry out school activities outside the educational center

Activities	Nc		Pv		Fc		Sp	
	N	%	N	%	N	%	N	%
Look for information on the Internet to do their homework	2	7.7	10	38.5	8	30.8	6	23.1
Access information using the platform, blog, website of the center …	8	30.8	12	46.2	4	15.4	2	7.7
Submit assignments and homeworks using the center's platform, blog, website …	7	26.9	13	50	5	19.2	1	3.8
Use simulations or video games to learn	8	30.8	10	38.5	6	23.1	2	7.7
Carry out activities (exercises, research, writing …) to learn different subjects	5	19.2	12	46.2	5	19.2	4	15.4
Make videos, photo compositions …, with a computer / tablet	11	42.3	13	50	1	3.8	1	3.8
Make presentations with a computer / tablet	7	26.9	11	42.3	4	15.4	3	11.5
Do evaluation or review exercises of the studied topics	7	26.9	7	26.9	11	42.3	1	3.8
Use e-mail, WhatsApp or the school platform to communicate with other students about homework, assignments, questions …	7	26.9	8	30.8	7	26.9	4	15.4
Use email, WhatsApp or the school platform to communicate with teachers.	13	50	11	42.3	0	0	1	3.8

Note: Nc (Never). Pv (Rarely). Fc (Frequently). Sp (Always)

4. CONCLUSIONS AND DISCUSSION

In this work, the digital competence in the communication area of Spanish Compulsory Education students has been evaluated, taking into account their knowledge, skills and attitudes. The socio-familial and technology user profiles of those who achieved the best results in this evaluation have also been identified.

The level of digital competence in the area of communication demonstrated by the students is a pass (basic) in knowledge and skills. These results coincide with those of other investigations, such as that carried out by Martínez Piñeiro et al. (2019) or Paredes Labra et al. (2019) in this same area of competences, or that carried out by García Valcárcel et al. (2019b) in the security area; but they contrast with others (Amor Almeida & Serrano Rodríguez, 2019; González García et al., 2019) in which students reach a high level. In the attitude dimension, very positive evaluations are obtained, this data coincided with those of other works (Ausín & Delgado, 2015; Casillas-Martín et al., 2020).

As has been shown in some studies (Almerich et al., 2020; Hatlevik & Christphersen, 2013; Pérez Escoda et al., 2016; Wong & Kemp, 2018), socio-familial variables and those related to the possession of digital devices and their use, influence the acquisition and development of digital competences.

Regarding the socio-familial profile of the students with the best results in the evaluation, most of them do not have problems of coexistence with the rest of their classmates in the school. Regarding the structure of their family nucleus, they belong to nuclear or traditional families, formed by a mother, a father and their children (Martín López, 2000) and a minority to single-mother families, a family nucleus in which the mother faces upbringing of the children alone (Fernández-Martínez & Avilés-Hernández, 2020). Finally, their leisure preferences are focused on carrying out activities with the family, playing outdoors, sports and reading; versus watching television programs and playing video games.

As technology users, their profile is specified in:

They have a high number of digital devices at home and are multi-device users (Cabezas-González & Casillas-Martín, 2019). This fact corroborates that home access to this type of device favors a good level of digital competence, as has already been shown in some research (Aesaert & van Braak, 2014; Ames, 2016; Van Deursen & Van Diepen, 2013).

During the week, the digital device that they use the most is the television and those that use the least, the computer and the tablet. On weekends, the television is still the most widely used device and, what is most striking, is that they do not use a mobile phone. In this regard,

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we can find studies that show the positive effect of this variable on digital competence (Almerich et al., 2018; Zhong, 2011), while others show its absence (Van Deursen & Van Diepen, 2013; Vekiri & Chronaki, 2008).

Regarding the activities they carry out with technology, they are large consumers of digital content, mainly music and YouTube videos, and they use it quite a bit to search for information on the Internet. On the contrary, they do not use social networks, a fact that contrasts with other investigations such as that carried out by Ballesta Pagán et al. (2021) in which an early start is confirmed in the social networks of third and fourth year Compulsory Secondary Education students in the Murcia region (Spain), who acknowledge using them for some years for personal reasons and social needs of the affective and relational type.

When they use technology to carry out homework outside the school, it is to carry out evaluation exercises or to review the contents studied in the classroom. If we take into account that there is research that concludes that the use of technological tools in the classroom significantly affects the performance of students (García-Martín & Cantón-Mayo, 2019), it could be said that these activities could be related to a good level of digital competence of these students.

Finally, we would like to point out as the main contribution of this work the proposal of a socio-familial and use of technology profile of adolescents who present a good level of digital competence in the area of communication. This can provide useful knowledge when designing training proposals for the development of this competence. We would also like to indicate that the main limitation of this study is in its sample because its size does not allow generalization of the results, but it does serve as a model and orientation for the study of the influence of other types of variables on development and acquisition of digital competences.

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Digital divide in the didactics of basic education teachers: the case of public schools in the city of Chihuahua (Mexico)

Brecha digital en didáctica de docentes de educación básica: caso escuelas públicas en la ciudad de Chihuahua (México)

Exclusão digital na didática de professores da educação básica: o caso das escolas públicas da cidade de Chihuahua (México)

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Abstract

This descriptive research aimed to diagnose the existing distance in the access, use and appropriation of ICT in teachers. The digital divide in didactics was studied in 152 teachers from 20 public primary schools in the city of Chihuahua (Mexico) and the inequality of possibilities observed by teachers to access the use of adequate information sources, knowledge of other didactic alternatives, was identified and to own training processes through ICT. Through a survey of closed and open questions, the behavioral traits of teachers in relation to ICT were identified, such as: use focused on conventional technologies, low access for academic purposes and high learning needs through training processes.

KEYWORDS

Access to information, Digital divide, Technological disparity, Primary school teacher, Basic education.

Resumen

Esta investigación descriptiva, cuyo objetivo es diagnosticar la distancia existente en el acceso, uso y apropiación de las TIC en el profesorado, estudia la brecha digital en didáctica en 152 docentes de 20 escuelas primarias públicas de la ciudad de Chihuahua (México) e identifica la desigualdad de posibilidades que observan los docentes para acceder al uso de fuentes de información adecuadas, al conocimiento de otras alternativas didácticas y a los procesos de formación propia por medio de las TIC. A través de una encuesta de preguntas cerradas y abiertas, el artículo identifica rasgos de comportamiento del profesorado en relación con las TIC tales como: uso centrado en tecnologías convencionales, bajo acceso para fines académicos y altas necesidades de aprendizaje a través de procesos de capacitación.

PALABRAS CLAVE

Acceso a la información, Brecha digital, Disparidad tecnológica, Docente de educación primaria, Educación básica.

Resumo

Esta pesquisa descritiva, cujo objetivo é diagnosticar a distância existente no acesso, uso e apropiação das TIC por professores, estuda a exclusão digital da didática com 152 professores de 20 escolas primárias públicas da cidade

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de Chihuahua (México) e identifica a desigualdade das possibilidades observadas pelos professores de acesso ao uso de fontes de informação adequadas, ao conhecimento de outras alternativas didáticas e aos próprios processos de formação por meio das TIC. Por meio de um questionário de perguntas fechadas e abertas, o artigo identifica traços comportamentais dos professores em relação às TIC, tais como: uso focado em tecnologias convencionais, baixo acesso para fins acadêmicos e altas necessidades de aprendizagem por meio de processos de formação.

1. INTRODUCTION

The objective of educational institutions is to help their students have the possibility of becoming autonomous citizens, acquiring the knowledge, skills, and attitudes that they will put into practice throughout their lives. The position that teachers take in front of their groups depends, among other factors, on the decisions that contemplate the adoption, assimilation, adaptation, management, transfer and development of new strategies that will be definitive for students to be competitive in the digital age and that they do not run the risk of being left behind in the face of the challenges of globalization (Olsson & Hallaberg, 2018).

To achieve these purposes, the role of teachers and the adaptive process they have undergone are essential. Therefore, teachers must increase all possible skills that are related to Information and Communication Technologies (ICT). These digital skills will give students a privileged place once they finish their studies, compared to other citizens. In addition, these are necessary skills to perform in various areas of academic and daily life, being essential for research processes, content generation and consultation of different sources of information (European Training Foundation, 2018).

One of the most compelling characteristics of today is the speed with which changes occur.

Today's economies have been radically transformed, moving from the classic division (agriculture, industry and services), towards considerations such as the knowledge economy. Therefore, those who are currently teaching become knowledge workers. This leads us to reflect on how the daily uses of ICTs contribute to creating frameworks of democratic equality and cultural diversity, through the pedagogical and social inclusion dimensions (Vivanco, 2015). ICTs have undoubtedly contributed to the change in the educational paradigm in general, which implies the integration of the teacher into a cultural and symbolic ecosystem, where new codes and languages are formed (Arcos-Vega et al., 2017).

Although the mere incorporation of ICTs into educational institutions does not necessarily contribute to improving student and teacher performance, schools demand to experience a significant organizational change, based on investment in infrastructure and specialized training (Arcos-Vega et al., 2017). Regarding ICTs, such training must contemplate, without claiming to be exhaustive, the following elements: (1) access and availability, both for students and teachers; (2) inclusion in the curriculum development; (3) daily use to evaluate performance; (4) access to professional development opportunities for teachers; (5) inclusion of school directors; and (6) support for teachers

with examples of good practices (Tarango & Marzal, 2011).

There is a strong demand to train emerging generations of teachers to incorporate new ICT-related learning tools into their classes, which includes the need to acquire extensive knowledge about ways of learning. Different stages of teacher development are observed in terms of technology adoption processes and there is a need for the acquisition of skills in the management of technologies to access the pedagogical content, as well as for joint work and collaboration in the Internet (Hardman, 2019; Mlambo et al., 2020). It is also noted the need to obtain planned training in elements related to the context, culture, vision, leadership, the definition of standards on the expected levels of competence and planning in the technological inclusion in pedagogical processes (Song & Siu, 2017).

In the case of this research, whose data collection took place before the confinement produced by the COVID-19 pandemic, it arises from the assumption that basic education teachers in Mexican public education lack the computer skills to carry out their teaching activities, inside and outside the classroom. This is caused by the low training they receive in this regard and because teaching and learning processes with characteristics of traditional education are prioritized, compared to that focused on innovation. In both circumstances, there is a fundamental concern about the superiority shown by students in the use of ICTs, compared to the performance of teachers and that this causes a cognitive lag, thereby affecting various educational conditions that can be crucial in the training processes.

1.1. INCLUSION OF ICTS IN EDUCATIONAL AND TEACHER TRAINING PROCESSES

The integration of ICTs in the actions of the main educational actors, specifically in the teaching staff, faces a series of conditions, among which stand out:

a) The training spaces propose new ways of communication between the actors in the process, where ICTs are essential to increase elements related to training and learning, including the "representation of content, carrying out activities, teacher-student and student-student interactions, learning evaluation, among others" (Pérez & Telleria, 2012, p. 87).

b) The environment in relation to the digital divide faced by teachers must take into account the "internal gap", that is, inequalities in access to ICTs, especially in developing countries, since it represents a form of social exclusion that impacts on participation in connectivity (OECD, 2019b).

c) The determination of current public policies related to the access, training and educational use of ICTs favor the presence of these technological elements in the personal and institutional environments of teachers. Therefore, it is necessary for institutions to be clear about the conceptual differentiation between public policies, strategies, and plans, the first being those proposals from governments that promote aspects of access, quality and development of teachers according to specific needs (UNESCO, 2013).

d) The identification of the levels of digital migration that teachers and students are experiencing or are willing to experience through tangible elements of displacement

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towards a highly technical world. It also implies determining how far they are from certain realities, since teachers are entities that generate new individual and collective identities (Piscitelli, 2017).

e) The substantial differences existing in the teachers' environments, which influence the incorporation of ICTs in education, generate various scenarios as mediating instruments: (1) relationships between the students and the content or learning tasks; (2) relationships between teachers, teaching and learning content or tasks; (3) relationships between teachers and students; and (4) the joint activity of teachers and students when developing teaching and learning activities (Coll, 2017).

According to the previous considerations, the successful integration of ICTs into education implies prioritizing teacher training in their use, "including a transformation of their beliefs and pedagogical practices" (Díaz, 2017, p. 145). Apart from the instrumental use of ICTs, teachers need to integrate them to learn to teach meaningfully, in addition to transforming their beliefs and practices regarding educational, assessment and learning approaches, methods and standards.

The challenge in reducing the digital divide is not only the interference that is made when comparing internal national conditions, nor in relation to those nations that present a socioeconomic level equal to or lower than their own, but the condition observed in the digital divide in developed countries where levels are drastically lower (OECD, 2019a). For example, in the case of the United States and Canada, these countries have reached high levels of availability of computer equipment in the population, also in terms of telephone services and the rest of the ICT-related indicators. Although a country

has low levels of ICT availability in the general population, especially compared to the aforementioned countries, its growth in recent years is surprising, in addition to the efforts made by governments to establish public policies in this regard (González & Ugalde, 2016).

The digital divide usually has multiple characteristics, being that related to didactic processes one of the most precise, since it can be measured through the levels of digital literacy (Londoño et al., 2018), inherent to academic or work processes or activities that are done to find solutions to everyday problems. In this regard, it is also worth studying the problem from the perspective of the different generations in the population, with an apparent difference in the behavior of social groups in relation to ICT. It is noted that it depends on the time in which they were born, differentiating between individuals who were born before the emergence of certain technologies and those who see this phenomenon as something that already existed in society and whose adaptability to ICTs is usually greater (Tarango & Marzal, 2011). It is important to consider the above, compared to current educational concepts and models, such as e-Learning (electronic learning), n-Learning (nomadic learning) or b-Learning (Blended Learning or blended learning), which have come to diverse fields of application, but implying a predisposition to the mobility of the subjects (Cheng & Loke, 2018).

When aspects such as the quality of accesses, the availability of broadband connection or the application of content to solve specific problems are analyzed, access to ICTs is dimensioned differently and measured from a quantitative point of view. The Latin American Integration Association (2003) identifies four qualitative dimensions in relation to the conditions of access and use of technologies: (1) motivation to access; (2) access to certain types of material;

(3) competencies for access; and (4) technological approach for advanced uses. Therefore, the behavioral issues that teachers and students can observe in schools in relation to the importance given to the use of formal information is an aspect of great interest (López, 2017). Of all these aspects, the questions of cultural change in the subjects to identify the importance of ICTs potentially implies costlier processes than the mere acquisition of infrastructure.

Some of the aspects to consider in the development of the digital divide in aspects related to didactics are: (1) a large part of the people are not digital natives; (2) believe that students handle technology better than teachers, which will not necessarily be the true in all cases; (3) imagine that in all contexts there are elements of technology available for academic and work activities; and (4) think that all available content is good and assume that all users know how to differentiate between quality content and those that lack it (Wilson, 2016).

Regarding teachers and their relationship with ICTs, the paradigm is maintained that the solution is to offer only training in the use of tools, but the study of the digital divide and didactics promotes the development of different substantial aspects, such as: (1) teach teachers to use technological tools to integrate them into their work and academic discipline; (2) generate pedagogical appropriation processes in relation to technologies rather than mere acquisition (access or use); and (3) technological tools are forms of access to knowledge and not necessarily forms of knowledge production (Mouza, 2008).

People's relationship with technology can have different views. For the purposes of this research, it is considered pertinent to consider a form of expression that regularly manifests itself in teachers and their students, which is defined as the particular way of perception that one has of the level of knowledge or development of others, known as "cognitive underdevelopment." This is an expression that seeks to present a way of describing the condition of self-concept, where the lack of belief in personal capacities is often manifested and it is an aspect that is related to cultural factors.

Although the concept of cognitive underdevelopment has been studied in psychology, medicine and even sociology, there is little reference to it in education. However, in the study of ICTs, this has been a concept considered important in relation to the conceptualization that teachers have about the level of technological knowledge that their students possess. The marked cognitive underdevelopment lies in believing, for example, that students have higher and better levels of technological knowledge than they do in relation to the use, application, and appropriation of ICTs.

In education and in research fields on ICTs, it is considered that cognitive underdevelopment even manifests itself as a social or cultural inheritance and is regularly related to less schooling and higher school failure, which is usually associated with individuals who come from underprivileged families (Esping-Andersen, 2008). This may represent the condition of cognitive underdevelopment of a group, institution or country in general.

2. STATEMENT OF THE PROBLEM AND OBJECTIVES OF THE INVESTIGATION

The problem studied in this research is based on the lack of knowledge of the relationship that basic (primary) education teachers have with ICTs in the city of Chihuahua (Mexico), this being the geographical environment in which the researchers of this study work. Likewise,

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it is based on the assumption that their level of use and access arises from the initiative of the students and not from the teaching staff themselves, since the former show a direct and constant approach to them. Therefore, an analysis of this nature is problematized from the following aspects:

a) The massive diffusion of the use of ICT contributes to the transformation of social and economic spheres. By not addressing this situation in a timely manner, educational lags are promoted based on learning limitations in the face of globalization.

b) The demands of the knowledge society represent a high relationship with the ability of the subject in their relationship with ICTs. When there is no formal and efficient strategy to support the development of skills for its management, limitations are generated in the education of those involved.

c) The study of the presence and type of use of ICTs allows the identification of real conditions, which potentially would serve to promote academic development and contribute to the generation of changes.

Thus, the general objective of the research is to diagnose the existing distance in the access, use and appropriation of ICTs observed by the teachers of the public primary schools participating in the study. The article aims to identify behavioral traits of the participants, mainly from the configuration of the existing cultural capital, the teaching practice through the use of circulating information and the identification of the conditions of infrastructure and available knowledge.

This purpose is broken down into the following specific objectives:

a) Identification of existing features in the access, use and appropriation of ICTs.

b) Definition of elements that distinguish behaviors in relation to the daily use of ICTs in academic and personal activities.

c) Classification of conceptualizations of the pedagogical use of ICTs.

d) Knowledge dimension, as well as real and desired experiences in relation to ICTs.

e) Identification of the conditions of cognitive underdevelopment in relation to ICTs.

3. METHODOLOGY

The research focused on a quantitative approach, based on a non-experimental, transectional and exploratory method, since the essential ideas that were derived from the observations made by the participating subjects from their own situations were described, which corresponded to an empirical analysis. The educational institutions were selected by a convenience sampling, from which data was collected from the teaching staff. These were identified according to the following homogeneous characteristics: (1) location in a sector of medium socioeconomic level, where there are sufficient conditions for both students and teachers to have access to ICTs; (2) location in a residential complex with all basic services (electricity, water, drainage and paving), specifically in the city of Chihuahua (Mexico); (3) offer academic activities in two shifts (morning and evening); and (4) be classified within the range of large schools, with at least five groups per level and per shift. In total, 20 schools were selected.

The measurement instrument consisted of a survey with 20 items divided into three general parts: context, current use and projection, which are described below:

a) Part I. Context (eight questions). Identifies fixed variables such as gender, age, years completed in the professional practice,

maximum level of studies achieved, name of theinstitution in which they work, shift and grade in which classes are taught and a diagnostic question that allowed to identify the conceptualizations that participants have about ICTs.

b) Part II. Current usage (four questions). Identify features of ICT use, type of ICT regularly used and training needs. This section includes an open question where the respondent can indicate if they require any training or advice on the subject.

c) Part III. Projection (eight questions). It includes the elements of conceptualization of the pedagogical use of ICTs, projects to promote the pedagogical use of ICTs, identification of experiences in the use of ICTs, language access, use of technologies outside the academic environment (by type and purpose) and measurement of the cognitive underdevelopment of teachers in comparison with their students in the use and management of ICTs. This section also allows the respondent to answer open questions in which they express their opinion about the pedagogical use of ICTs and the impact they have had on their academic life.

The construction of the measurement instrument began by writing the items that responded to the research objectives, thus obtaining a first version that was subject to validation by three experts in Information Sciences who were members of the National System of Researchers of Mexico. As a result of this validation, the wording of several items had to be improved and several open questions were also included where the respondent could expand the information provided, thus obtaining a second version of the instrument that served as a pilot questionnaire.

A total of 37 pilot questionnaires were applied, finding confusion only in one question. The wording of this question had to be changed to obtain the final version. It is important to comment that, although the final version of the instrument contains only 20 items, the open questions included by the experts' judgment contributed to increase the response time of the instrument, and it was also considered necessary to apply it with the face-to-face technique, therefore the option of making a sample as small as possible was considered. Finally, and in relation to the measurement instrument, it was ensured that the researcher in charge of its application read, before starting each interaction with the interviewee, an informed consent indicating that the answers are treated completely anonymously and will be used only for academic purposes.

For the information analysis, the categorical and ordinal qualitative variables included were analyzed using the SPSS program. The open questions were analyzed by first performing a manual categorization and finally a systematization of results.

4. RESULTS

The main findings identified in the research are presented according to the structure of the data collection instrument. In each section, the global findings are included and comparisons of the age criteria (presented quantitatively in completed years or qualitatively grouping the data by ranges, as appropriate) and/or gender of the study group are incorporated in some criteria of evaluation.

4.1. PART I. CONTEXT

Of the teaching staff participating in the study, 28.3% were men and 71.7% were women. The

arithmetic mean of the average years of tea-ching practice was 3.28 years (standard devia-tion of 1.493), with a greater permanence in fe-males compared to males, as shown in Figure 1.

Figure 1

Comparison of years of teaching practice by gender
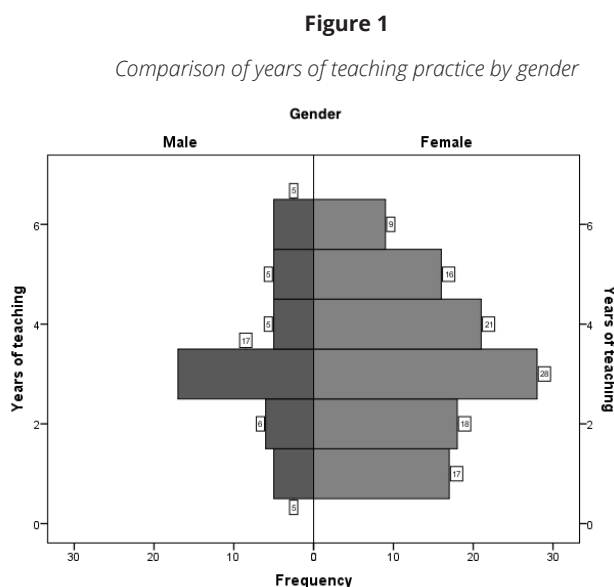
The arithmetic mean of ages of the participa-ting teachers was 38.17 years, the minimum being 23 and the maximum 63, with a standard deviation of 8,108. Figure 2 shows a pyramidal distribution of the age of completed years and relates it to a distribution by gender, observing a more normal distribution behavior in the case of the female sex.

Likewise, the distribution of the maximum le-vel of studies completed identified four types: basic education teachers (trained in Normal Schools, national institutions that are specifica-lly dedicated to the training of teachers for ba-sic education at the primary level, as opposed to those who specialize in middle school, high school or higher education) (11.2%), university degree (71.7%), master's degree (15.8%) and doctorate (1.3%).

Figure 2
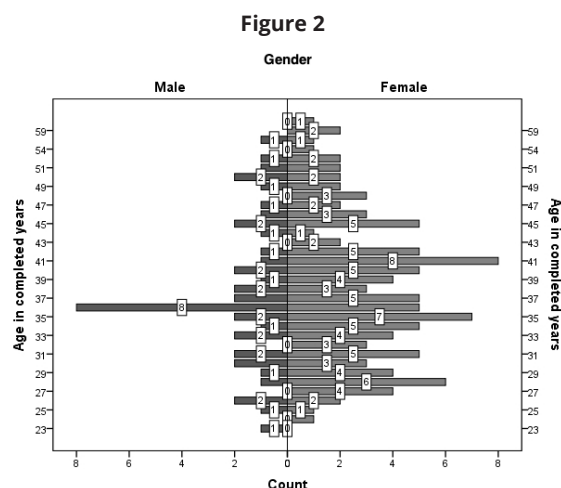
Participants in the study were asked to freely express their own conceptualization of ICTs, from which different expressions, mostly con-crete and generic, were obtained. These were grouped into six types and one without respon-se (see Table 1), with 85.44% focusing on three particular conceptualizations of 146 participa-tions: technological tools, modes of support for teaching, and daily use of technology.

Table 1

ICT conceptualization

Conceptua-lizations	Fre-quen-cy	Per-cen-tage	Accu-mu-lated percen-tage
Technological tools	81	55.47	55.47
Modes of support for teaching	28	19.17	75.17
Daily use of tech-nology	15	10.27	85.44
Access to informa-tion	10	6.84	92.28
Technological implements and devices	8	5.48	97.76
Technological ad-vances	4	2.73	100.0
Total	146	100.0	

4.2. PART II. CURRENT USE OF ICTS

In this section of findings, it was possible to identify that 90.8% of the teaching staff participating in the study use ICTs, indicating that this use is manifested within their teaching practice in four areas: (1) email (55.90%); (2) websites of their subjects (36.2%); (3) virtual classrooms such as Moodle or Blackboard (5.98%); and (4) websites designed or created by the teacher (1.92%).

Regarding the conditions of knowledge and use of ICTs, teachers were asked if they had any interest or needed to receive training, to which 86.8% expressed interest in participating and 13.2% indicated not being interested, since they considered they had enough knowledge to be functional in this regard. The teachers who expressed interest in training in ICTs indicated 10 topics of interest from 115 teachers, but the majority focused on the use of basic computer programs (see Table 2).

Table 2

Type of ICT in which you would like to receive training or advice

Types	Fre-quen-cy	Per-cen-tage	Accu-mula-ted per-centage
Manejo de programas básicos (Word, Excel, PowerPoint)	53	46.09	46.09
Diseño de sitios Web	23	20.0	66.1
Aulas virtuales	14	12.17	78.3
Uso didáctico de internet	9	7.83	86.1
Plataformas escolares	4	3.48	89.6
Programas computacionales de diseño	4	3.48	93.1
Material novedoso relacionado con las TIC	3	2.61	95.7
Servicio de reparación en las TIC y terminales	2	1.74	97.4
Estrategias de búsqueda de información	1	0.87	98.3
Elaboración de blogs	1	0.87	99.1
Redes sociales	1	0.87	100.0
Total	115	100	

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4.3. PART III. PROJECTION

This section includes the future vision of teachers regarding their relationship with ICTs in the pedagogical field. This vision was subdivided into six aspects that are detailed below.

Conceptualization of the pedagogical use of ICTs: the participating teachers were questioned about their own concept of the pedagogical use of ICTs. The result was that 100% registered five concepts from 128 teachers, the most frequent being expressed as "application of technologies in didactic support" with 53.9% (see Table 3).

Table 3

Conceptualization of the pedagogical use of ICTs

Conceptualizations	Frequency	Percentage	Accumulated percentage
Application of technologies in didactic support	69	53.90	53.90
Tools to improve performance	34	26.56	80.46
Achievement of competencies and skills	11	8.59	89.05
Innovation processes in education	8	6.25	95.32
Access to information sources	6	4.68	100.0
Total	128	100.0	

b) Knowledge of promotion projects on the pedagogical use of ICTs: when questioning the knowledge of government projects generated to promote the use of ICTs in pedagogical practice, 72.3% of those surveyed did not know of any and 29.9% expressed to know at least one, listing the following current programs in the Mexican basic educational context: "Digital Skills for Everyone", "Tablets for fifth grade students" and "Media classrooms". In addition, they made some proposals that do not really exist as promotional projects on the pedagogical use of ICTs: "School platforms", "School network" and official websites. They also mentioned programs out of date, such as "Enciclomedia".

In addition to the above and according to the results shown in Figure 3, it is possible to observe that, in both genders, the participating teachers lack sufficient knowledge in relation to promotional projects of pedagogical use, which could favor teachers and their didactic activities.

Figure 3

Proportion by gender on knowledge of projects to promote the pedagogical use of ICTs
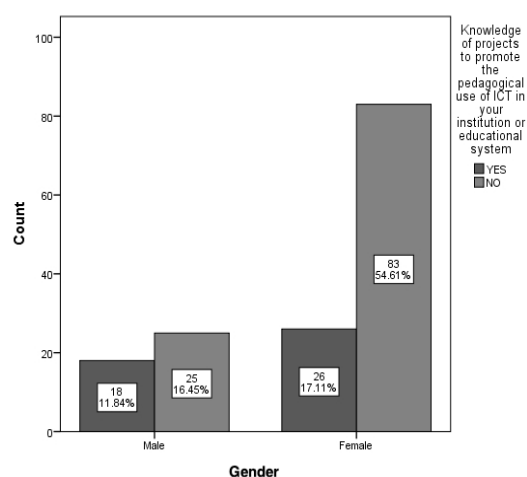
c) Language used in the consultation sources: the pedagogical resources accessed by teachers consisted of sources in their mother tongue (82.74%) and access to information sources in both Spa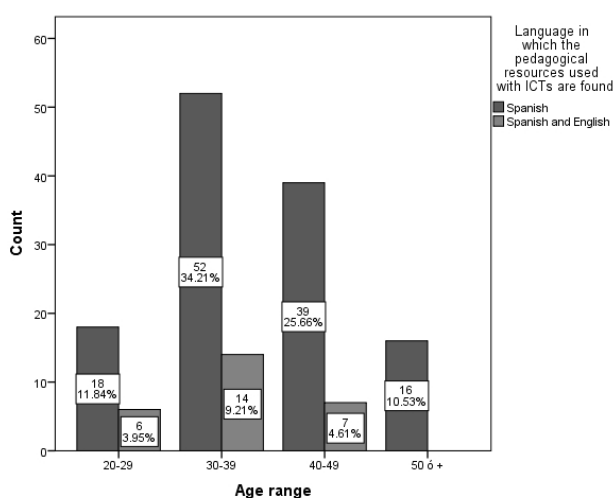nish and English (17.76%). Regarding the types of recurring equipment, the participating teachers mention using the following devices for personal matters and not within the pedagogical scope: cell phones, desktop computers, laptops and tablets (see Figure 4).

Figure 4

*Comparison of the idiomatic use
of query sources with age ranges*

d) Identification of experiences in promoting the use of ICTs: the main experiences narrated by teachers in the use of ICTs in terms of their teaching and learning processes were the following: (1) didactic applications developed in pedagogical use ; (2) application of previous experiences in the use of ICTs not related to education, of which adaptations were made; (3) development of personal experiments aimed at making ICTs relevant in the subjects they teach; (4) demonstrate time savings in class preparation using ICTs; (5) demonstrate an attitude towards students regarding the pedagogical use of ICTs; and (6) promote the learning of other languages in the students (especially the

English language by using documents in that language).

e) Purposes of the use of ICTs: this aspect was measured by presenting the teachers with a closed list of five options, from which they could only choose the one they considered using most frequently. According to the percentage of responses, the purposes in the use of ICTs can be ordered as follows: (1) seeks relevant information, maintains academic contact with colleagues or as a means of academic learning (55.92%); (2) use ICTs to send emails, chat, search for music and watch news (26.97%); (3) access ICTs out of curiosity or for some aspect related to entertainment (9.21%); (4) make decisions about their personal and work life through ICTs (5.92%), this aspect implies a low level of empowerment with technologies in citizen participation actions, in decision-making and in actions to reduce distance with authorities; and (5) none (1.97%).

f) Aspects of cognitive underdevelopment: although this indicator may represent an independent theme to develop future research, for this study it was considered relevant, but it was only evaluated through an item that represented the vision that teachers have in relation to their level knowledge about ICTs compared to their students. According to the results obtained, it was observed that: (1) 57.89% of the participants considered that the students have a lower knowledge of ICTs than the teaching staff; (2) 22.37% responded that knowledge in relation to ICTs is the same between teachers and students; and (3) the remaining 19.74% answered that students have superior knowledge in relation to ICTs than teachers. This last percentage would represent, in general, the real measurement of

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cognitive underdevelopment in relation to ICTs due to the perception that teachers have about their inferiority in this kind of knowledge.

In Figure 5 it is possible to observe the comparison of cognitive underdevelopment and years of teaching practice. It was found that the longer in the professional practice, the conception that the teaching staff is above the student body in the use and disposition of ICTs decreases. This same behavior is observed if cognitive underdevelopment is compared with the age range, since younger teachers tend to conceptualize that their level of computational knowledge is above that of students and this condition decreases as the age range grows.

Figure 5

Comparison of the level of cognitive underdevelopment and years of teaching practice
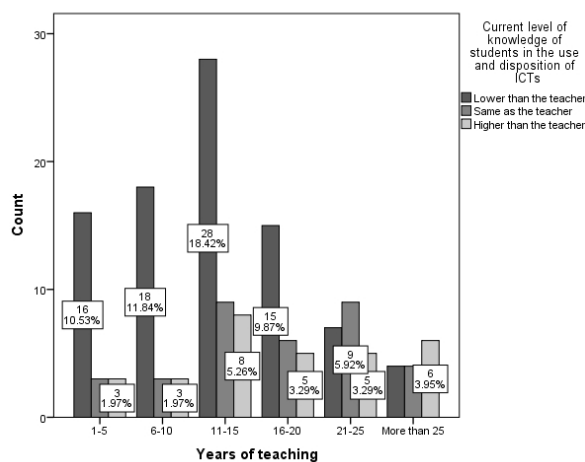
5. DISCUSSION

Changes in behavioral traits in specific situations are defined, beyond the teacher's own personal decision, in a pedagogical background based on suddenly imposed educational models where the use of ICTs is determined by a perspective that starts from reality, the conditions of relevance, relevance and possibility; based on government policies, programs and projects, and specifically on educational systems (Avendaño Porra, 2015).

Beyond the interests of the teachers themselves, the incorporation of ICTs in education is based on national policies related to reducing the digital divide, supporting educational modernization and the acquisition of cognitive skills and abilities. But they have been addressed only to students and not to teachers (Sunkel et al., 2013). All this has caused the training of teachers to maintain a marginal or scarce condition.

The results of the study show that there are low intentions towards the priority given to ICTs by teachers, both in the didactic field and in personal matters. For Castro et al. (2007), this is due to the fact that the forms of communication between students-students are very different from the way this process happens between teachers-students, especially manifested through the diversity of ways in which content is produced, consumed and distributed, be verbal or written.

The conditions of irruption of interconnectivity and ICTs happen differently in the so-called digital natives (young people), compared to the population known as digital migrants (adults), where the former show practically innate skills and use technologies in all areas of their life. On the other hand, the latter only resort to its use in imminent, regularly personal, situations whe-

re is not possible to incorporate their access to ICTs in situations that publicly compromise them (Matamala Riquelme, 2016).

This is complemented by proposing that it should be considered that both populations, natives and digital migrants, observe different ways of learning, as well as in the ways of seeking to encourage others to learn (García et al., 2014). The complications of conceptualization of ICTs lie in the fact that they were born as scientific advances in the field of computing and telecommunications, and not necessarily in environments linked to educational processes in the classroom (Cruz Pérez et al., 2019).

The fundamental reasons for considering the recognition of the low level of cognitive underdevelopment of teachers, lies especially in the resource limitations that education systems tend to experience in countries with a developing economy, as is the case of Mexico. This is justified in the vision of Ovejero Bernal (2008), who proposes that people's cognitive acts are conditioned by experience and the forms of ideological, theoretical and empirical reflection, determined by the reality of the environment and their own status of social underdevelopment.

Studying gender as a determining element in the relationship with ICTs may be relative if the perspectives of different authors in this regard are considered. For example, Trejo Sirvent et al. (2015) include the analysis of behaviors according to the gender of the participants, not to find differences, but to identify forms of social interaction. On the other hand, García Guevara (2005) proposes that the study of the participation of teachers according to their gender offers the problem of being studied from different approaches, which regularly generate controversies and even radical positions. In the case of education, it must be taken into ac-

count that there is an apparent lack of public policies applied to reality to improve situations based on gender. Actions occur based on the individual will of the faculty rather than on the government's own actions.

In recent decades, education in Mexico has shown interest in involving teachers in the use and application of ICTs in their teaching activities, since it is considered that priority has only been shown towards activities to favor the student body. There are institutional initiatives that propose to generate innovation processes in education with actions that favor an integral, ethical, aesthetic, scientific and humanistic training through the promotion of the diversity of learning environments in all educational programs and modalities (Rodríguez Armenta & Padilla Muño, 2007). These attempts correspond to seeking the increase in digital literacy of teachers, not only based on the frequency with which ICTs are used, but also on measuring teachers' efforts to access knowledge related to the subject in order to strengthen their teaching practice, their perception of the acquired competences and the integration of these technologies in their educational practice (Garzón Clemente, 2012).

6. CONCLUSIONS

In terms of a descriptive research, the study identifies elements that allow defining recurring behavioral traits in the access, use and appropriation of ICTs by the teachers of the public primary schools studied. However, given the dynamism of today's education and society, such situations could change substantially, both positively and negatively.

According to the data analysis, the real experiences manifested by the teachers show that when using ICTs, their application is given

greater importance to solve personal matters (problem solving, leisure and entertainment) over didactic matters. Therefore, teachers do not see the need to change their pedagogical practices, since they consider that electronic processes are not decisive to contribute to the change of their pedagogical practice. This means that students conceive learning as a broader scope and, consequently, teachers continue to ponder as priorities the actions that arise within the classroom by continuing to use conventional resources.

The lack of teachers participating in the study showing difficulty or precision in specific conceptualizations towards the purpose of ICTs seems to be a condition of their little approach to them. This problem is not limiting of this study, but manifests itself in all areas, since even the scientific literature itself observes such a condition where the definitions around ICTs are usually very general and not at all precise. There is the idea that these are means to transform information, use computer equipment and specific ways of storing information

The cognitive underdevelopment studied in this research focuses particularly on identifying the concept that teachers have about their level of competitiveness in the use and management of ICTs in relation to their students. For the case, the low level of cognitive underdevelopment observed through data collection was assessed. However, this becomes marked in relation to the years of experience within teaching and as the age level of the teaching staff increases.

An essential aspect focuses on the marked difference in results between genders, favoring the female gender in a broad way. This aspect, rather than being linked to gender studies issues, is based on the very nature of the characteristics of men and women in relation to teaching and the approach to ICTs. It should be recognized that Mexican basic education, in general, is attended predominantly by female teachers.

The research presents the limitations of having collected data from a reduced sample and of staying at the level of description of results based on the teachers' self-perception. However, it precisely clarifies the condition experienced in the environment and achieves the proposed objectives. Although experimental processes were not reached at a methodological level, as well as in varied areas and with a wide geographical dimension, it would be advisable to consider it for future research, as long as this is supported by the presence of guidelines and public policies regarding the issue of study.

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Digital competence of higher education professors: analysis of academic and institutional factors

Competencia digital de profesores de educación superior: análisis de factores académicos e institucionales

Competência digital de professores de ensino superior: análise de fatores acadêmicos e institucionais

4

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Abstract

This article aims to analyse the differences associated with the variables of teaching and institutional nature in the level of proficiency of teachers in digital competences, using the Dig-CompEdu framework as theoretical reference. A quantitative approach was used and the data collection strategy was based on an online survey. The sample was composed of 846 Portuguese higher education professors linked to 37 universities and 76 polytechnic institutes. The results indicate that characteristics such as working at PhD program level, teaching online and being linked to polytechnic institutes are associated with higher levels of digital competence.

KEYWORDS

Digital competence, Higher education, Dig-CompEdu.

Resumen

El objetivo de este artículo es analizar las diferencias asociadas a las variables de carácter docente e institucional en el nivel de competencias digitales en los docentes, tomando como referencia teórica el marco DigCompEdu.

Se adoptó un enfoque cuantitativo y la estrategia de recopilación de datos se basó en una encuesta en línea. La muestra estuvo compuesta por 846 profesores portugueses de educación superior vinculados a 37 universidades y 76 institutos politécnicos. Los resultados indican que características como trabajar a nivel de programa de doctorado, impartir e-learning y estar vinculado a institutos politécnicos se asocian a mayores niveles de competencia digital.

PALABRAS CLAVE

Competencia digital, Educación superior, Dig-CompEdu.

Resumo

O objetivo deste artigo é analisar as diferenças associadas às variáveis de caráter docente e institucional no nível de competências digitais em professores, tomando como referencial teórico o marco DigCompEdu. Adotou-se abordagem quantitativa e a estratégia de coleta de dados baseou-se em questionário online. A amostra foi constituída por 846 professores portugueses do ensino superior vinculados a 37 universidades e 76 institutos politécnicos. Os resultados indicam que características

como trabalhar em nível de doutorado, lecionar e-learning e estar vinculado a institutos politécnicos estão associadas a níveis mais elevados de competência digital.

1. INTRODUCTION

The inclusion of Information and Communications Technology (ICT) in higher education settings has led to important advances which has affected university teachers. It has resulted in a marked change in their instructional method, moving from transmissive teaching based on traditional methodologies to enriched learning environments, and promoting the use of more activities that foster autonomy and collaboration (Guillén-Gámez & Mayorga-Fernández, 2019).

According to Maderick et al. (2016) and Guillén-Gámez and Mayorga-Fernández (2019), there is a notable scarcity of studies examining the assessment of teachers' digital competence. The studies available are mostly on personal variables such as gender, age and length of experience (Amhag et al., 2019; Ashrafzadeh & Sayadian, 2015; Guillén-Gámez & Mayorga-Fernández, 2019; Noori, 2019; Pedro et al., 2021; Tena et al., 2016). These studies are, however, important considering that the development of students' basic competences, digital competences being one of them, requires teachers with a level of digital competences that allow them to use technology effectively in their activities, enabling construction and adaptation to the new challenges inherent to the 21st century competences (Cantabrana & Cervera, 2015; Díaz, 2019). This article seeks to contribute to the study of professors' digital competences in higher education.

1.1. DIGITAL COMPETENCE

Knowing how to use technology is not the same as knowing how to teach with technology. Mishra and Koehleer (2006) deeply explored this idea when they proposed the Technological Pedagogical Content Knowledge (TPCK) model:

> The relationships between content (the actual subject matter that is to be learned and taught), pedagogy (the process and practice or methods of teaching and learning), and technology (both common as blackboards and advanced as digital computers) are complex and nuanced. (Mishra & Koehler, 2006, p. 9)

The European Parliament and the Council of the European Union, recognizing that education contributes to the preservation and renewal of the common cultural base of society, recommended eight key competences for lifelong learning, among them, digital competences (European Parliament & Council of the European Union, 2006).

UNESCO (2008) was one of the forerunners in the development of frameworks that promoted the use of ICTs in education, recognizing the significant potential of ICTs to accelerate economic progress, reduce the digital divide, and support the development of inclusive knowledge societies, based on human rights, achieving gender equality and empowerment.

In 2010, the European Commission launched "Europe 2020 – a strategy for smart, sustainable and inclusive growth", proposing seven ini

tiatives, including a Digital Agenda. The Digital Agenda was at the beginning of the Digital Economy & Society Index (DESI), which demonstrates the digital performance of each European Union (EU) Member State (European Commission, 2010a, 2010b, 2014, 2016) and stimulates development in this field.

Digital competences involving cognitive, behavioural, and technical competences help mitigate the numerous problems and challenges of the knowledge society. The importance of digital competences in education is at the centre of discussions of major global organizations such as the United Nations Educational Scientific and Cultural Organization (UNESCO) (2018), the United Nations (2020) and the Council of the European Union (2018), as well as the European Commission (2020a), and globally prestigious institutions such as the International Society for Technology in Education (ISTE) (2020) and the Education and Training Foundation (ETF) (2018).

UNESCO's ICT Competency Framework for Teachers Version 3.0 (UNESCO, 2018) presents specific guidelines for the planning of educational and professional development programs for teachers to fulfill their role in training students with the integration of technologies.

> The effective integration of ICTs in the schools and classrooms can transform pedagogy and empower students. In this context, it is essential that teachers have the competencies to integrate ICTs in their professional practice to ensure the equity and quality of learning. Teachers also need to be able to harness ICTs to guide learners in developing Knowledge Society skills such as critical and innovative thinking, complex problem solving, the ability to

collaborate, and socio-emotional skills. (UNESCO, 2018, p. 6)

The 2030 Agenda for Sustainable Development, was adopted by the UN General Assembly with 17 Sustainable Development Goals (SDGs). ICTs related targets are addressed in: Quality education (Goal 4), Gender equality (Goal 5), Infrastructure (Goal 9), Reduced inequalities within and across countries (Goal 10), Peace, justice and strong institutions (Goal 16) and Partnerships for the goals (Goal 17) (Unesco, 2018).

The Council of the European Union (2018) redefines digital competence as:

> Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking. (p. 9)

According to Cabero-Almenara et al. (2020), the digital revolution has transformed, in various aspects, the university environment, requiring the promotion and development of digital teaching competence in Higher Education. The digital teaching competence is a requirement for a professional teacher profile that allows him to design, implement and evaluate training actions oriented so that the teacher can use the technology with his students in a didactic way (p. 364).

The Instituto Nacional de Tecnologías Educativas y Formación del Profesorado (INTEF) and the Ministerio de Educación, Cultura y Deporte

(MECD) of the Spanish government, have been making efforts in digital teaching competences since 2012 through the Marco Común de Competencia Digital Docente. The current version (October 2017) is an adaptation of DigComp 2.1 and DigCompEdu.

Digital competent teachers not only use technology but also significantly integrate them in the teaching and learning process, providing a practical meaning to education through digital resources, making it collaborative, interactive and dynamic (Sales et al., 2019).

The emergence of technical and digital innovation tools in the classroom has led to an increase in new teaching models in which teaching and assessment strategies are no longer exclusively based on face-to-face and individual interactions between teachers and students, making the teaching competence fundamental in the education process as well as an effective integration of the use of ICTs in the educational context (Caswell et al., 2008; Padilla-Hernández et al., 2020; Ramírez-Montoya et al., 2017; Rohatgi et al., 2016).

The most recent publication of the European Union on digital competence for citizens is DigComp 2.1: The Digital Competence Framework for Citizens (Carretero et al., 2017). As for digital competences of teachers, the most recent document was published by Redecker (2017) and is the European Framework for the Digital Competence of Educators: DigCompEdu, described in detail below.

1.2. AIM OF THE STUDY

This research aims to analyse the differences associated with teaching related factors (level of teaching cycle and course modality), institutional related factors (institutional category and institutional funding sector) and their relationship with the level of proficiency in digital competence of higher education teachers, considering the six areas of DigCompEdu. This study is based on the following research questions:

RQ1– What is the level of digital competence of Portuguese higher education professors?

RQ2– Are there statistically significant differences in the level of digital competences of Portuguese higher education professors arising from teaching-related factors (level of teaching cycle and course modality)?

RQ3– Are there statistically significant differences in the level of digital competences of Portuguese higher education professors arising from institutional related factors (institutional category and institutional funding sector)?

1.3. FRAMEWORK

For this study, DigCompEdu (Redecker, 2017) was adopted as conceptual background. This choice was based on: i) its consolidated use by the scientific community (Caena & Redecker, 2019; Dias-Trindade et al., 2020; Dias-Trindade & Moreira, 2018; Gilioli et al., 2019; Lucas et al., 2021; Pedro et al., 2021; Santos et al., 2021; ii) its superior evaluation results when compared to other frameworks (Cabero-Almenara et al., 2020); iii) the inclusion of a native data collection instrument (Redecker, 2019); and iv) the fact that it has a Portuguese language version (Lucas & Moreira, 2018).

DigCompEdu was designed to align with institutional and contextual requirements in different countries, connecting the development of digital competences of teachers and students. and linking them to institutional capacity development (Caena & Redecker, 2019). It describes the competences to support the use of digital tools to improve and innovate education and is organized into six areas with 22 interlocking competences: Professional engagement (PE);

Figure 1

Figure 1

DigCompEdu competence areas
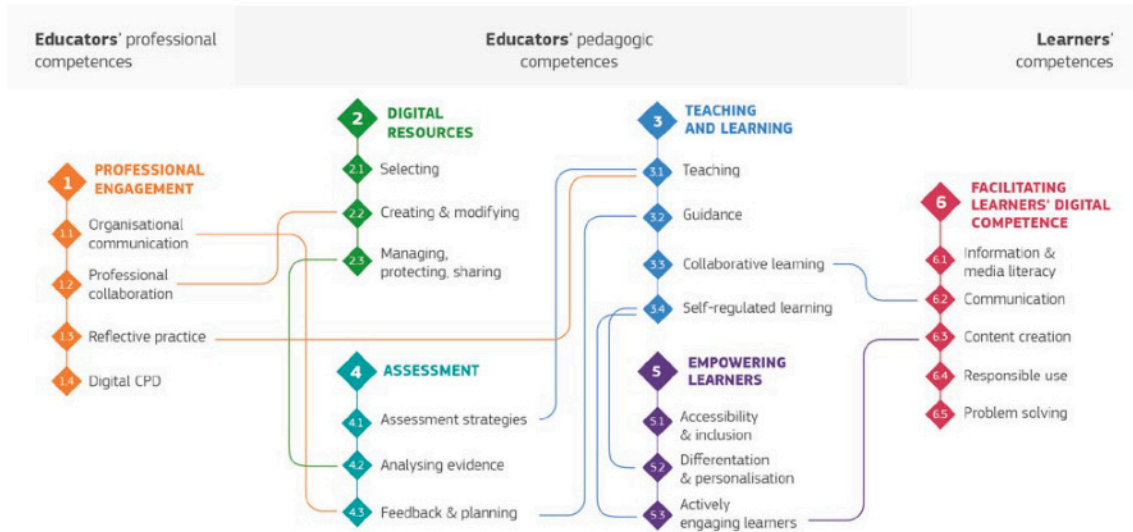
Source. Redecker (2017)

digital resources (DR); teaching and learning (TL); assessment (AS); empowering learners (EL) and facilitating learners' digital competence (FL). This is presented on Figure 1.

The progression in proficiency levels is cumulative in the sense that each higher-level descriptor includes all the lower-level descriptors, that is, they assume an increasing degree of complexity, as shown in Figure 2.

Figure 2

DigCompEdu competence areas

Source. Redecker (2017)

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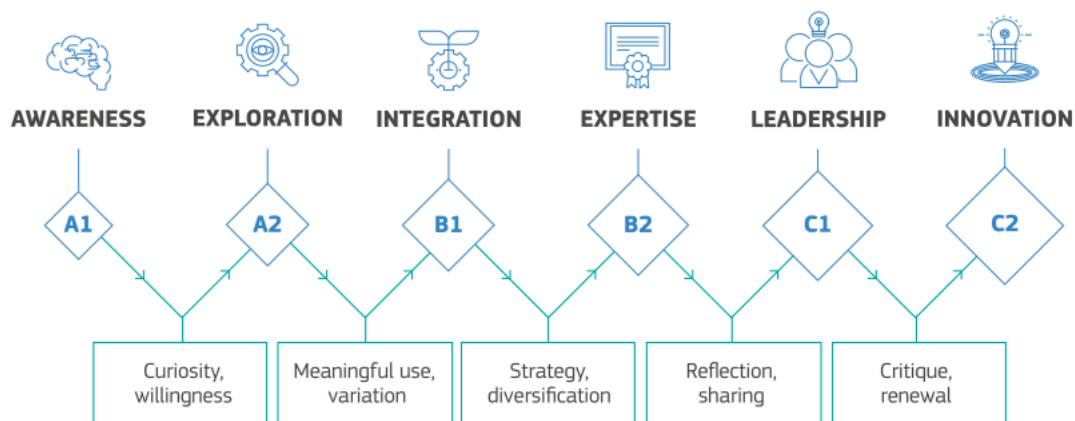
1.3.1. DATA COLLECTION INSTRUMENT

The DigCompEdu Check-In, native to DigCompEdu, has been statistically validated by several researchers in order to gauge the level of proficiency of teachers, both in elementary and secondary school levels (Benali et al., 2018; Dias-Trindade et al., 2019; Dias-Trindade & Moreira, 2018; Ghomi & Redecker, 2019; Silva et al., 2019) as well as in higher education (Dias-Trindade et al., 2020; Pedro et al., 2021; Santos et al., 2021), including in the Portuguese context (Dias-Trindade et al., 2019, 2020; Dias-Trindade & Moreira, 2018; Lucas et al., 2021).

The instrument is composed of 22 questions, one question per competency, with five alternative responses. This allows a score of 0 to 4 points per question, which enables a maximum score of 88 points for the overall assessment and by area, varying according to the number of questions-competence (Caena & Redecker, 2019; Lucas et al., 2021; Redecker, 2019), as explained in Figure 3.

Figure 3

General proficiency by levels and areas

OVERALL LEVEL	A1 – Newcomer 0 to 20	A2 – Explorer 21 to 33	B1 - Integrator 34 to 49	B2 - Expert 50 to 65	C1 - Leader 66 to 80	C2 - Pioneer 81 to 88

LEVEL FOR AREA

◆ PROFESSIONAL ENGAGEMENT
- ▶ A1 - 0 to 4
- ▶ A2 - 5 to 7
- ▶ B1 - 8 to 10
- ▶ B2 - 11 to 13
- ▶ C1 - 14 to 15
- ▶ C2 - 16

◆ DIGITAL RESOURCES
- ▶ A1 - 0 to 3
- ▶ A2 - 4 to 5
- ▶ B1 - 6 to 7
- ▶ B2 - 8 to 9
- ▶ C1 - 10 to 11
- ▶ C2 - 12

◆ ASSESSMENT
- ▶ A1 - 0 to 3
- ▶ A2 - 4 to 5
- ▶ B1 - 6 to 7
- ▶ B2 - 8 to 9
- ▶ C1 - 10 to 11
- ▶ C2 - 12

◆ TEACHING AND LEARNING
- ▶ A1 - 0 to 4
- ▶ A2 - 5 to 7
- ▶ B1 - 8 to 10
- ▶ B2 - 11 to 13
- ▶ C1 - 14 to 15
- ▶ C2 - 16

◆ EMPOWERING LEARNERS
- ▶ A1 - 0 to 3
- ▶ A2 - 4 to 5
- ▶ B1 - 6 to 7
- ▶ B2 - 8 to 9
- ▶ C1 - 10 to 11
- ▶ C2 - 12

◆ FACILITATING LEARNERS´S DIGITAL COMPETENCE
- ▶ A1 - 5 to 6
- ▶ A2 - 7 to 8
- ▶ B1 - 9 to 12
- ▶ B2 - 13 to 16
- ▶ C1 - 17 to 19
- ▶ C2 - 20

1.4. BACKGROUND IN PORTUGAL

The Portuguese higher education system is composed of universities and polytechnics. University education is oriented towards the provision of solid scientific training, combining the efforts and competences of teaching and research units. Polytechnic education is professionally oriented and intervenes in advanced technical training (Assembleia da República Portuguesa, 2007). Both can be offered by public and private institutions. According to current data (Direção-Geral do Ensino Superior, 2021), Portugal has 37 universities and 76 polytechnics, 36.3% private and 63.7% public.

The most recent data available for the population surveyed in this article indicated a total of 35,283 faculty members. Regarding the institutional category, 61.2% (n=21,595) of the professors worked in university education and 38.5% (n=13,688) in polytechnic education. Regarding the institutional funding sector, 77.3% (n=27,279) worked on public establishments and 22.7% (n=8,004) on private institutions. As for gender, 54.9% (n=19,368) were male and 45.1% were female (n=15,915) (Fundação Francisco Manuel dos Santos, 2021).

Several studies conducted in the Portuguese context have adopted the same theoretical references as this article (framework and instrument), which have marked the B1 integrator level of proficiency as an overall result, either with elementary school teachers (Dias-Trindade & Moreira, 2018; Lucas et al., 2021) or in higher education teachers (Dias-Trindade et al., 2020; Pedro et al., 2021; Santos et al., 2021).

Focusing on elementary and secondary education, Lucas et al. (2021) identified that factors such as gender, age, and experience exerted effects on the averages obtained in the levels of digital competence of teachers. Dias-Trindade and Moreira (2018) point out contrary results regarding age and disciplinary department by identifying no significant differences.

In higher education, Dias-Trindade et al. (2020) indicate that faculty staff aged 40-49 years tend to have higher proficiency levels than other age groups (30-39 years, 50-59 years, and 60-69 years). Regarding the scientific area, professors of arts and humanities presented higher results than the others (science and technology, economics, psychology and education).

In their study, Santos et al. (2021) indicate that professors with a master's degree obtained higher scores (B2) than graduates and PhDs. Regarding age and length of career, they did not identify significant differences between the groups. Faculty teaching on PhD programs scored higher (B2) than faculty teaching only undergraduate and master's courses (B1). Faculty teaching in courses with some percentage of online learning scored higher (B2) than faculty teaching exclusively on-campus courses (B1). Finally, professors working in polytechnic education obtained higher scores (B2) than those working in university education (B1). No differences were identified in relation to the institutional funding sector (B1).

Pedro et al. (2021), whose study focuses on the six areas of DigCompEdu and considers variables of a personal nature, identified no differences regarding gender. Regarding the level of education, differences were identified in the areas 'teaching and learning' (TL) and 'empowering learners' (EL); teachers with a lower academic degree (undergraduate) showed lower results (A2) when compared to those with a master's or doctorate (B1). Regarding age and career time, the results were very similar, with a difference only in the EL area in the intermediate ranges (age groups 45-54 years and 55-64 years and in career time of 11-20 years, 31-30 years, and 31-40 years), showing higher results (B1) when compared to the other ranges (A2).

2. METHODOLOGY

The aim was to analyse the differences associated with teaching related factors (level of teaching cycle and course modality) and institutional related factors (institutional category and institutional funding sector) on the level of digital competences in higher education professors considering the six areas of DigCompEdu. Thus, a quantitative approach was adopted, using an online survey as data collection strategy, following the procedures recommended by Rea and Parker (2014). This follows the trend of

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most research on digital competence that focuses on the use of measurement instruments based on self-assessment of the perceptions of professors, supported by webtools that analyse, describe and/or measure the level of proficiency in digital competence based on the opinions of respondents (Durán et al., 2019).

The DigCompEdu Check-in tool (Redecker, 2019), translated into Portuguese (Lucas, 2019), was incorporated into a webtool available at http://www.digcomptest.eu/ (Santos et al., 2020). The development of this tool allowed quick access to the data and gave the respondents access to a self-diagnosis report of the digital competences of professors, which was automatically sent to their email.

The teaching related factors considered the level of teaching cycle where the professors mostly taught (bachelor's, master's and doctorate, with only one option for the respondent to choose) and course modality (100% on-campus courses, 70% on-campus and 30% e-learning courses, 30% on-campus and 70% e-learning courses or 100% e-learning). The institutional factors considered the institutional category (universities vs. polytechnic) and institutional funding sector (public vs. private).

2.1. RELIABILITY

Based on Cronbach's alpha (Cronbach, 1951), an internal consistency analysis was performed and a score of .936 was obtained. The corrected item-total correlation and the squared multiple correlation tests (Table 1) allowed us to understand that the instrument has a high internal consistency. The values were similar to those found by other researchers (Benali et al., 2018; Ghomi & Redecker, 2019; Lucas et al., 2021), even when applied to the same population as in this article (Dias-Trindade & Moreira, 2020).

Table 1

Reliability

AREA/COM-PETENCE	CORRECTED ITEM-TOTAL CORRE-LATION	SQUARED MULTIPLE CORRE-LATION
Area 1 – Professional engagement		
1.1	.5750	.3930
1.2	.5090	.3200
1.3	.6030	.4750
1.4	.5190	.3190
Area 2 – Digital resources		
2.1	.5300	.3680
2.2	.5640	.4000
2.3	.4270	.2400
Area 3 – Teaching and learning		
3.1	.7090	.5630
3.2	.6880	.5350
3.3	.5650	.3830
3.4	.7120	.6030
Area 4 – Assessment		
4.1	.6920	.5960
4.2	.5570	.4000
4.3	.7040	.5620
Area 5 – Empowering learners		
5.1	.6720	.4760
5.2	.6250	.4470
5.3	.6770	.5070
Area 6 – Facilitating learners' digital competence		
6.1	.5330	.3830
6.2	.6780	.5240
6.3	.5760	.4100
6.4	.6320	.4800
6.5	.6620	.4760

2.2. DATA ANALYSIS

In the first stage of data extraction, only the respondents who stated that they were higher education professors and worked in the Portuguese context were considered. This procedure was essential because the data collection tool is open and is available to fill out on the web.

The process of data treatment and analysis was based on the application of descriptive and inferential statistical techniques, such as multivariate analysis of variance (MANOVA) and Tukey post-hoc, using IBM® SPSS® Statistics (version 26.0.0.0). The use of MANOVA was intended to analyse the effect of the factors selected for this study (Cohen et al., 2018; Larson & Betsy, 2014).

2.3. SUBJECTS

Data collection took place between the second semester of 2019/2020 and the first semester of the 2020/2021.

The dissemination and invitation to participate in this study were carried out via: i) email invitation sent to the leaders of all higher education institutions, 37 universities and 76 polytechnic institutes (Direção-Geral do Ensino Superior, 2021), ii) directly to the faculty members when the email address was publicly available on the internet; and iii) dissemination of the research through the https://www.incode2030.gov.pt/acoes-com-selo-incode2030 website.

Considering the population data, the minimum sample size was determined using the multinominal proportions technique (Thompson, 1987) for a confidence level of 95% resulting in a minimum number of 510 faculty members.

The sample consists of 846 Portuguese higher education professors, as described in Table 2. It

was possible to identify that at least 45 institutions were represented in the sample (39,82% of high education institutions of Portugal), although the information on which institution the respondent worked was not required.

Table 2

Demographic characteristics of the participants

Gender	Male	Female			
N (%)	455(53%)	391(46.2%)			
Level of teaching cycle	Doctorate	Master's	Bachelor's		
N (%)	126(14.9%)	274(32.4%)	446(52.7%)		
Course modality	100% On-c	70% On-c and 30% e-L	30% On-c and 70% e-L	100% e-L	
N (%)	515(60.9%)	247(29.2%)	43(5.1%)	41(4.8%)	
Institutional category	Universities	Polytechnic			
N (%)	520(61.5%)	326(38.5%)			
Institutional funding sector	Public	Private	Military and political public		
N (%)	776(91.7%)	70(8.3%)	0(0%)		

Note: On-c= on-campus courses; e-L= e-Learning courses

3. RESULTS

Based on the results obtained after the surveys were filled out by the respondents, the overall and per area scores were calculated and related to the proficiency levels shown in Figure 4.

3.1. OVERALL RESULTS

The overall result of the proficiency level in digital competence pointed to an overall mean of 47.88 points, with a standard deviation of 16.08, indicating a B1 (integrator) proficiency level.

The analysis by area showed that the professors in the AS area presented an A2 – explorer

level, lower than all other areas in which they presented a B1 – integrator level, according to Table 3.

Table 3

Results by area

Areas	Level (mean±sd)
PE	B1 (9.7±3.07)
DR	B1 (7.18±2.44)
TL	B1 (9.03±3.63)
AS	A2 (5.55±2.59)
EL	B1 (6.03±3.06)
FL	B1 (10.35±4.30)

Note: SD= Standard Deviation

3.2. TEACHING RELATED FACTORS

In this section, we present the results considering the level of teaching cycle and course modality where professors conducted their teaching activities.

3.2.1. LEVEL OF TEACHING CYCLE

The professors showed a difference in proficiency level in the AS and EL areas, starting at A2 in bachelor's to B1 in doctorate. In the other areas, (PE, DR, TL, and FL) no differences in levels were identified, as can be seen in Table 4.

Table 4

Proficiency level by area and level of teaching cycle

Area	Bachelor's (n=446) (Mean±SD)	Master's (n=274) (Mean±SD)	Doctorate (n=126) (Mean±SD)
PE	B1 (9.46±3.03)	B1 (9.89±2.92)	B1 (10.62±3.33)
DR	B1 (7.00±2.23)	B1 (7.28±2.43)	B1 (7.59±2.63)
TL	B1 (8.60±3.52)	B1 (9.21±3.49)	B1 (10.15±4.03)
AS	A2 (5.39±2.49)	A2 (5.53±2.60)	B1 (6.12±2.85)
EL	A2 (5.78±3.00)	B1 (6.15±3.02)	B1 (6.67±3.27)
FL	B1 (9.74±4.27)	B1 (10.59±4.07)	B1 (11.96±4.46)

Note: SD= Standard Deviation

MANOVA demonstrated the existence of a statistically significant effect, as shown in Table 5.

Table 5

MANOVA level of teaching cycle

Significance test	Value	F	Hypothe-SIS(-DF)	Error(-DF)	P Value
Pillai's trace	.044	3.114	12	1,678	< .0001

The subsequent univariate ANOVAs showed an effect on the teaching level at which the professor worked on the means of all areas, as shown in Table 6.

Table 6

Subsequent ANOVAs level of teaching cycle by area

AREA	F (2,843)	P VALUE
PE	7.398	.001
DR	3.276	.038
TL	9.714	<.0001
AS	3.873	.021
EL	4.454	.012
FL	14.167	<.0001

Tukey's post-hoc identified that the differences (p<.05) found in the PE, DR, AS, and EL areas are found between faculty members teaching at the doctoral and undergraduate levels. In the TL area, a difference was found between faculty members teaching at the doctoral level compared to the master's level, as well as at the undergraduate level. Finally, in the FL area, a difference was found between all groups, based on the levels at which the professors teach.

3.2.2. COURSE MODALITY

The professors showed a difference in proficiency level in the PE, DR, TL, AS and EL areas. The FL area showed no differences, as shown in Table 7.

Table 7

Proficiency level by area and course modality

AREA	100% On-c (n=515) (MEAN±SD)	70% On-c 30% e-L (n=247) (MEAN±SD)	30% On-c 70% e-L (n=43) (MEAN±SD)	100% e-L (n=41) (MEAN±SD)
PE	B1 (9.02±3.06)	B1 (10.82±2.64)	B2 (11.40±3.02)	B2 (11.20±2.49)
DR	B1 (6.65±2.38)	B2 (8.10±2.11)	B2 (8.14±2.68)	B1 (7.17±2.87)
TL	A2 (7.99±3.50)	B1 (10.48±3.15)	B2 (11.51±3.74)	B1 (10.71±2.90)
AS	A2 (4.91±2.40)	B1 (6.47±2.60)	B1 (7.07±2.83)	B1 (6.32±1.97)
EL	A2 (5.24±2.93)	B1 (7.21±2.78)	B1 (7.74±3.74)	B1 (7.07±2.56)
FL	B1 (9.39±4.28)	B1 (11.72±3.82)	B1 (12.30±4.72)	B1 (12.12±3.22)

Note: On-c= On-campus courses; e-L= e-learning courses; SD= Standard

In the PE area, the results were higher (B2) in the 70% and 100% e-learning professors compared to the others (B1). In general, the DR and TL areas presented higher results when the professors worked in both modalities, when compared to the group of professors who work exclusively in one of the modalities. In the AS and EL areas, the group of professors who work only in on-campus courses scored lower (A2) than the e-learning modality (B1), regardless of the proportion, as shown in Table 7.

MANOVA demonstrated a statistically significant effect, as shown in Table 8.

Table 8

MANOVA course modality

SIG-NIFI-CANCE TEST	VA-LUE	F	HYPO-THE-SIS(-DF)	ERROR(-DF)	P VA-LUE
Pillai's trace	.165	8.118	18	2,517	< .0001

The subsequent univariate ANOVAs showed an effect on course modality on the means of all areas, as shown in Table 9.

Table 9

Subsequent ANOVAs course modality by area

AREA	F (3,842)	P VALUE
PE	29.613	< .0001
DR	23.712	< .0001
TL	42.415	< .0001
AS	29.716	< .0001
EL	32.962	< .0001
FL	24.093	< .0001

Tukey's post-hoc identified that the differences (p<.05) found in the PE, TL, AS, EL, and FL areas were identified among faculty members working exclusively in on-campus courses compared to faculty members working in e-learning, regardless of the proportion. In the DR area, the difference was found only among faculty members who worked exclusively in on-campus courses compared to those who worked in the e-learning modality in the proportions of 30% and 70%.

3.3. INSTITUTIONAL RELATED FACTORS

In this section we present the results considering two institutional related factors: the type of institution and its funding model.

3.3.1. INSTITUTIONAL CATEGORY

The professors showed a difference in proficiency level in the EL area, in which polytechnic professors showed a higher result (B1) than university professors (A2). In the other areas, no differences were found, with PE, DR, TL and FL having B1 proficiency level and AS A2, according to Table 10.

Table 10

Proficiency level by area and institutional category

Area	Universities (n=520) (Mean±SD)	Polytechnic (n=326) (Mean±SD)
PE	B1 (9.57±3.13)	B1 (10.10±2.93)
DR	B1 (7.18±2.52)	B1 (7.17±2.30)
TL	B1 (8.79±3.66)	B1 (9.40±3.54)
AS	A2 (5.49±2.60)	A2 (5.63±2.57)
EL	A2 (5.87±3.03)	B1 (6.29±3.09)
FL	B1 (10.19±4.39)	B1 (10.60±4.14)

Note: SD= Standard deviation

MANOVA demonstrated a statistically significant effect, as shown in Table 11.

Table 11

MANOVA institutional category

SIG-NIFI-CANCE TEST	VA-LUE	F	HYPO-THE-SIS(-DF)	ERROR(-DF)	P VA-LUE
Pillai's trace	.018	2.502	6	839	.021

The subsequent univariate ANOVAs showed that there is an effect on the institutional category on the means of the PE and TL areas, as shown in Table 12.

Table 12

Subsequent ANOVAs institutional category by area

AREA	F (1,844)	P VALUE
PE	5.993	.015
DR	.002	.967
TL	5.531	.019
AS	.623	.430
EL	3.662	.056
FL	1.876	.171

3.3.2. INSTITUTIONAL FUNDING SECTOR

The professors showed no difference in proficiency level, as shown in Table 13.

Table 13

Proficiency level by area and institutional funding sector

Area	Public (n=776) (MEAN±SD)	Private (n=70) (MEAN±SD)
PE	B1 (9.74±3.09)	B1 (10.19±2.76)
DR	B1 (7.20±2.45)	B1 (6.86±2.33)
TL	B1 (8.96±3.65)	B1 (9.80±3.32)
AS	A2 (5.52±2.55)	A2 (5.86±2.98)
EL	B1 (6.03±3.04)	B1 (6.04±3.22)
FL	B1 (10.34±4.29)	B1 (10.41±4.41)

Note: SD= Standard deviation

MANOVA demonstrated the existence of a statistically significant effect, as presented in Table 14, although the subsequent univariate ANOVAs show no effect on any of the areas (Table 15).

Table 14

MANOVA institutional funding sector

Significance Test	Value	F	Hypothesis (DF)	Error(-DF)	P Value
Pillai's trace	.019	2.682	6	839	.014

Table 15

Subsequent ANOVAs institutional funding sector by area

AREA	F (1,844)	P VALUE
PE	1.382	.240
DR	1.303	.254
TL	3.480	.062
AS	1.099	.295
EL	0.001	.980
FL	0.018	.894

4. DISCUSSION

This paper aimed to analyse the differences in teaching-related factors (level of teaching cycle and course modality) and institutional related factors (institutional category and institutional funding sector) and their relationship with the level of proficiency in digital competence of professors.

Although Guillén-Gámez and Mayorga-Fernández (2019) identified in the literature that personal factors, such as gender and age, may result in differences in the level of university professors' digital competence, Lucas et al. (2021) point out that several works in this regard are contradictory, thus, there is no consensus in the academic community on the effect of such factors.

Few works have focused on analysing whether variables of an academic nature can influence the level of digital competence of university professors (Guillén-Gámez & Mayorga-Fernández, 2020; Santos et al., 2021), a gap that this article seeks to reduce.

In relation to factors that affect the proficiency level of professors, Guillén-Gámez and Mayorga-Fernández (2020) identified the number of national and international research stays, number of research projects, teaching innovation, number of master's studied and number of years of university teaching experience, with the last one having a negative weighting.

The results collected to answer the first research question indicate that the general level of proficiency in digital competences of professors is B1 – integrator. Other studies in the Portuguese context showed similar results (B1), either in basic and secondary education (Dias-Trindade & Moreira, 2018; Lucas et al., 2021) or in higher education (Dias-Trindade et al., 2020; Santos et al., 2021).

The overall results by area indicated lower results (A2) in the AS area compared to the others (B1). This fact is worrisome, since assessment is essential for monitoring students' progress, facilitating feedback, and to allow educators to evaluate and adapt their teaching strategies. As well, it is highly relevant for the evaluation of programs success and the prestige of institutions. At the same time, assessment can be a facilitator or bottleneck for innovation in education (Redecker, 2017).

Guillén-Gámez and Mayorga-Fernández (2020) also identified the deficiencies in assessment practices of higher education professors. They claim that professors make little use of the po-

tential that today's resources may have for assessment, and few studies focus on this issue.

In general, it was possible to identify differences in the level of proficiency in digital competences in relation to five out of six areas in DigCompEdu. The teaching-related factors showed the highest number of differences (7), especially in course modality (5), while the institutional-related factors showed few differences (1), according to the summary presented in Table 16.

Table 16

Difference between the level of proficiency in digital competence and factors

Area	TRF		IRF		Total by area
	CL	CM	IC	IFS	
PE	=	≠	=	=	1
DR	=	≠	=	=	1
TL	=	≠	=	=	1
AS	≠	≠	=	=	2
EL	≠	≠	≠	=	3
FL	=	=	=	=	0
Total by factor	2	5	1	0	

Note: TRF= Teaching-related factors, CL= Level of teaching cycle; CM= Course modality; IRF= Institutional-related factors; IC= Institutional category; IFS= Institutional funding sector

It is important to note that the institutional funding sector showed no difference in any of the areas. The FL area was the least affected, with no difference in any of the factors.

Bearing in mind the second research question and focusing on the differences in the level of digital competences of Portuguese higher education professors arising from teaching related factors (level of teaching cycle and course modality), differences were identified in the proficiency level of professors in the AS and EL areas. In the AS area, professors working at the bachelor's and master's levels showed lower levels (A2) than those teaching at the doctorate level (B1). In the EL area, bachelor's professors showed lower levels (A2) than those teaching in master's and doctorate courses (B1), making the difference between PhDs and graduates evident in these two areas.

Other studies point to important evidence that correlates with this article. Durán et al. (2017) and Santos et al. (2021) pointed out the positive relationship of the academic degrees of the faculty staff with their level of digital competence, which suggests that obtaining these degrees may be a process that promotes the development of the digital competences of the faculty (Pedro et al., 2021).

Factors directly related to research such as innovation in research projects/teaching (Guillén-Gámez & Mayorga-Fernández, 2019), number of national and international research stays, and number of research projects (Guillén-Gámez & Mayorga-Fernández, 2020) were identified as factors that show positive relationships with the level of proficiency in digital competences.

Teaching-related factors, such as the level of teaching cycle factor, shown statistically significant effects on the means in the tests. Tukey's post-hoc test identified that a difference is found in professors who teach at the doctoral level, whether this difference is only in relation to professors who teach at the undergraduate level (PE, DR, AS and EL), at the master's level (TL), or in relation to both (FL).

Also, in teaching-related factors, specifically the course modality, differences were identified in the level of proficiency of professors in the PE, DR, TL, AS and EL areas. In the PE area, higher results were found with the groups formed based on the two highest proportions of e-learning (B2) compared to the other groups (B1). In the DR area, the highest performance occu

rred when professors worked in both modalities simultaneously (B2) in relation to working in only one modality (B1). The TL area showed the highest level when professors worked in the proportion of 30 on-campus courses and 70% e-learning. The AS and EL areas presented the same behaviour: professors who worked exclusively in on-campus courses presented lower results (A2) when compared with professors who worked in e-learning (B1), regardless of the proportion.

In general, this article showed that professors who worked in the e-learning modality showed higher levels of digital competence than those who worked exclusively in the on-campus courses modality, with emphasis on the group of professors who worked 30% on-campus courses and 70% e-learning. Ramírez-Montoya et al. (2017) had already identified a difference in the level of digital competence between professors in traditional teaching (professors whose classes were fully on-campus) and online teaching (professors whose classes were developed in virtual environments).

Teaching in the e-learning modality demands comfortable levels of mastery from professors in several virtual environments and web tools, technical knowledge combined with pedagogical strategies for content production, regular use of communication tools (synchronous and asynchronous), systems and platforms such as repositories and virtual learning environments, as well as copyright and online conduct rules. Various evidences converge around a positive relationship of these fields and digital competence, as reported by researchers such as Durán et al. (2017) on the use of systems and programs in Web 1.0 and 2.0 environments, Ramírez-Montoya et al. (2017) in relation to the knowledge, production and use of Open Education Resources (OER), and Krumsvik et al.

(2016) in relation to the time professors are in front of the screens (screen time).

Vieira and Pedro (2021) state:

> As far as professor training is concerned, it is important to emphasize that, according to the answers of a considerable part of the respondents, the search for professional development in this area has been at the initiative of the professors, pointing to a lack of institutional valorisation of qualifications for and/or online education, especially in the Portuguese context. (p. 28)

The course modality showed statistically significant effects on the means. Tukey's post-hoc test identified that in the PE, TL, AS, EL and FL areas, the difference was between professors who worked 100% on-campus courses in relation to professors who worked in e-learning, regardless of the proportion. In the DR area, the difference was found only between professors who worked exclusively in on-campus courses in relation to those who worked in e-learning, in the proportions of 30% and 70%.

Finally, regarding the third research question (Are there statistically significant differences in the level of digital competences of Portuguese higher education professors arising from institutional related factors (Institutional category and Institutional funding sector)?) it was possible to see, in the institutional category, that the differences in the proficiency level of professors were identified only in the EL area, with the MANOVA showing a statistically significant effect on the PE and TL areas. Several other pieces of evidence in this regard indicate that faculty in polytechnic education were more digitally competent. Vicente et al. (2020) indicate that polytechnic faculty were more digitally innovative (80.9%) than university faculty (73.80%), and Pedro et al. (2021) highlight higher proficiency

levels in polytechnic faculty (B2) when compared to university faculty (B1).

Regarding the institutional funding sector, no differences in the level of proficiency in the areas were identified, although the MANOVA indicated a statistically significant effect.

5. CONCLUSION

The general level of proficiency in digital competences of Portuguese higher education professors was B1 – integrator, which indicates that there is plenty of room for improvement, especially concerning investment in professional development and stimulating self-exploration of pedagogically and scientifically valid digital environments and tools. This effort to increase the level of proficiency must be assumed by institutions and professors, and is relevant for the promotion of the digital competences of graduate and postgraduate students. The ability to facilitate learners' digital competence is an integral part of the digital competences of educators (Dias-trindade & Santo, 2021; Redecker, 2017).

One deficiency noted was in the AS area with an A2 – explorer level, compared to the others that scored a B1 – expert level, with the negative results of this deficiency magnified in the context of the COVID-19 pandemic. These deficiencies may have led faculty members to carry out the transfer of content taught in face-to-face classes to virtual learning platforms, thus promoting Emergency Remote Teaching (ERT) practices rather than e-learning (Hodges et al., 2020; Pérez López et al., 2020). The COVID-19 pandemic only made explicit the urgent need for professors to possess digital competences capable of grounding their pedagogical practice in virtual learning environments in line with a digital society and with the daily practices of their students.

As for the level of proficiency considering the teaching-related factors, differences were identified in both factors studied. In course modality, differences occurred in the AS and EL areas, both in the pedagogic competence dimension of DigCompEdu. It is important to highlight that although the difference was found only in these two areas (following the scale of the instrument), professors who teach at the doctoral level obtained higher means than the others in all of them, reinforcing the thesis that obtaining academic degrees and experience in research promotes digital competences, to the extent that today it is quite difficult to develop scientific research without a substantial knowledge of digital technologies (Pedro et al., 2021).

Specifically regarding course modality, differences were found in five of the six areas, demonstrating the strong impact of the modality on the level of proficiency. The professors who worked in the 30% on-campus courses and 70% e-learning proportion obtained the highest means, even higher than the 100% e-learning modality. This superiority of professors who worked in two modalities can be related, at least partially, to the framework adopted as a theoretical reference and that guides the instrument used in this article; DigCompEdu did not specifically consider the universe of e-learning or even *blended learning* (Mattar et al., 2020), thus it does not have specific digital teaching competences related to this teaching modality. The lack of difference in the facilitating learners' digital competence (FL) area can be explained in part because it does not reflect intrinsic professor competences (e.g., ability to perform a certain task). This area is about the capacity to enable learners to use digital technologies creatively and responsibly for information, communication, content creation, well-being and problem-solving.

Finally, some reports (Santos et al., 2021; Vicente et al., 2020) had already indicated the superior performance of professors linked to polytechnic institutes, either in terms of digital innovation or in terms of digital proficiency, which indicates the need for special attention to digital competences from universities, and even more for the traditional ones. With the results obtained in this article, it was possible to identify that this superiority was in the area of empowerment of learners, which deals with using digital technologies to enhance inclusion, personalization and the active engagement of learners, which showed higher results (B1) when compared to universities (A2). No difference was found in the level of proficiency when compared by institutional funding sector, indicating the need for investment in both technological infrastructure and the professional development of professors.

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The integration of technology in basic and secondary education in Portugal from the 70s of the 20th century to the present day

A integração da tecnologia na educação básica e secundária em Portugal desde os anos 70 do século XX à contemporaneidade

Integración tecnológica en la educación secundaria en Portugal desde la década de 1970 hasta la actualidad

5

ARTICLE

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Abstract

This systematic literature review aims to analyze the pedagogical experiences with the use of technologies in Portugal between the seventies of the twentieth century and today. It sought to understand how they were introduced into school over fifty years. A total of 47 articles were selected and analyzed from the SCOPUS, SCIELO and Web of Science indexing databases. It was found that, despite a certain conservatism very focused on the instrumental use of technology, more practices with pedagogical intent and more focused on the active participation of students have been implemented in recent years, highlighting the growing importance of teacher training in this field of digital technologies, with the aim of making teachers more competent and fluent in the pedagogical use of digital tools.

KEYWORDS

Portugal, Technology, Digital, Education, Basic and secondary education.

Resumo

Este trabalho de revisão sistemática da literatura visa analisar as experiências pedagógicas com recurso a tecnologias em Portugal, entre os anos setenta do século XX e a atualidade, procurando compreender como foram sendo introduzidas na escola ao longo de cerca de cinquenta anos. Foram selecionados e analisados 47 artigos das bases de indexação SCOPUS, SCIELO e Web of Science. Verificou-se que, apesar de algum conservadorismo ainda na utilização da tecnologia, muito centrada no seu uso instrumental, nos anos mais recentes têm-se concretizado mais práticas com intencionalidade pedagógica e mais focadas na participação ativa dos estudantes. Constatou-se também a importância crescente da formação docente neste domínio das tecnologias digitais, com o objetivo de tornar os professores mais competentes e fluentes no uso pedagógico do digital.

PALAVRAS-CHAVE

Portugal, Tecnologia, Digital, Educação, Ensino básico e secundário.

Resumen

Este trabajo de revisión sistemática de la literatura, tiene como objetivo analizar las experiencias pedagógicas con el uso de tecnologías en Portugal, entre los años setenta del siglo XX y la actualidad, tratando de comprender cómo se introdujeron en la escuela a lo largo de unos cincuenta años. Se seleccionaron y analizaron 47 artículos de las bases de datos de indexación SCOPUS, SCIELO y Web of Science, y se encontró que, a pesar de cierto conservadurismo en el uso de la tecnología, muy centrado en su uso instrumental, en los últimos años se ha convertido en prácticas más materiales con vocación pedagógica y más enfocadas a la participación activa de los estudiantes, destacando la importancia creciente de la formación docente en este campo de las tecnologías digitales, con el objetivo de hacer que los docentes sean más competentes y fluidos en el uso pedagógico de lo digital.

PALABRAS CLAVE

Portugal, Tecnología, Digital, Educación, Educación básica y secundaria.

The integration of technology in basic and secondary education in Portugal from the 70s of the 20th century to the present day

1. INTRODUCTION

Technology has influenced the school institution in a socially complex and non-linear relationship, which from an early age has been welcoming and transforming its own culture based on the new possibilities offered by the different technological artifacts that have contributed, above all, to improve the communication process. On the one hand, given the growth in the number of students, schools needed to create conditions to adapt; on the other hand, the increase in education turns out to be intrinsically linked to technological development.

However, when analyzing in particular the Portuguese case and how the introduction of technological innovations in education occurred at the beginning of the 20th century, it seems that these novelties (cinema, radio, various audio equipment and, in the second half of the century, television) ended up having a slow diffusion, sporadic, playful and almost exotic use. It was seldom integrated into pedagogical practices with the aim of improving teaching and learning processes.

This situation came from the scarcity of resources in most educational institutions, but it was also the result of almost zero concern for the training of teachers for the pedagogical use of technology.

The main objective of this work was to provide a contemporary vision of the use and the way in which education has appropriated technology since the introduction of computerized teaching in Portugal. In this sense, we sought to analyze the pedagogical experiences in the use of technologies in Portugal between the seventies of the 20th century and today, trying to understand how they were introduced in the Portuguese educational context, what type of pedagogical experiences were being carried out and what concerns have existed in the sense of preparing teachers for the pedagogical use of these technologies. An attempt was made to understand how or in what way they have become "educational technologies", in the sense attributed by Silva (1989), by underlining that "talking about educational technology essentially means making the educational process more effective and talking about efficiency means improving the learning" (p. 39), or Sarramona (1986) presenting the idea that educating oneself meant" becoming a man" and technology gave its contribution to make it even better.

2. THE EVOLUTION OF TECHNOLOGY IN SCHOOLS: FROM "SPELLING MACHINES" TO DIGITAL TECHNOLOGIES

It was in the 1960s that the first computers and the first generation of "Computer Aided Instruction" (CAI) emerged, taking inspiration from the Pressey machine. However, they were too expensive and did not achieve the expected objectives, that is, they did not demonstrate their usefulness in an educational context.

In the early days, the difference between CAIs and their predecessors, teaching machines, was in the type of technology to present the materials. Saettler (2004) explains that the student responded to the questions (filling in the spaces or marking the correct answer), immediately obtaining an answer. In case the system made a mistake, it immediately generated a new question and if the answer was correct, more material was presented. In other words, a technological upgrade to the Pressey machine.

Despite having a very high value, the introduction of these first computers opened the door to new experiences (Russel, 2006). Therefore, when in the 70s their value fell enough to make

its introduction into the school environment viable, there was a certain trend in its implementation in North American schools for fear that the United States would be left behind in terms of technological advances (Russel, 2006).

Teaching students to use computers seemed to be the solution to this problem, as well as ensuring that they were adequately prepared for the new demands of an increasingly technological society (Russel, 2006). Finally, what would be more important: computers could contribute to making the educational process more efficient.

In reality, what has been proven is that little by little and between the 60s and 80s, more and more schools began to have computers but still with a very precarious educational use.

In 1960, PLATO (Programmed Logic Automated Teaching Operations) began to be developed at the University of Illinois, which allowed individualized learning based on content previously prepared by the teacher (Unwin & McAleese, 1978).

This was the first successful computer, followed later by those produced by IBM and Apple. Based on the ideas of Pressey and especially Skinner (1958), IBM developed the IBM650 computer in 1953 and the first time it was used as a teaching support equipment was in 1959 for the training of American military pilots. (Thammishetty, 2015). It didn't take long for them to get to the schools.

The first IBM computer produced for a school was installed in 1966 at Brentwood Elementary School in East Palo Alto. In 1976, Apple also launched its first computer and in 1978 won a contest promoted by the Minnesota Educational Computing Consortium to equip the state's schools with 500 computers.

In the post-World War I period, technologies began to be used as "teaching aids", beginning in the 1960s to be called "learning aids" with the introduction of a teaching program that eventually modified the teaching and learning process in general, changed the teacher/student relationship and optimized the processes in the classroom (Silva, 1993).

Silva (1993) indicates that the way to talk about "educational technology" was opened with educational research carried out in the 70s, the development of cybernetics, and hypermedia in the 80s.

In Portugal, this period of systemic approach does not move away chronologically from its development at the international level, with a starting point in the 1960s and its affirmation in the 1970s and, above all, during the 1980s. This was characterized by the introduction of educational technology as a component in teacher training, whether initial or continuous, and was accompanied by projects focused precisely on the affirmation of educational technology as a strategic area of the educational system itself (Silva, 1993).

Concern for teacher training for the use of educational technologies grew especially from the end of the 1980s, after the Portuguese educational reform, and became part of the teacher training component as a curricular unit of different degree courses, postgraduate and courses. Silva (2001) states that "the Global Reform Proposal presented in 1989 included, within the scope of the curricular and pedagogical reorganization plan, three execution programs that especially value the implementation of Educational Technology in the educational system" (p. 245).

The first program involved the development of a first technological project in the field of education. It emerged in 1985 and was entitled MI-

NERVA (Computer media in teaching: rationalization / empowerment / updating) and had the objective of bringing technologies closer to the educational process. At the beginning of the 1990s, state programs co-financed by the European Community - Educational Development Program for Portugal (PRODEP) appeared, which provided schools with various technological resources such as overhead projectors, tape recorders, photocopiers, televisions, and computers.

From then to the present, the education digitization programs have been varied, always following the different projects that the European Union has been developing and culminating in the current Action Plan for the Digital Transition, with an area dedicated to education that has been in force since 2020.

Until the mid-80s, the introduction of technologies in education was done without a real concern for their incorporation into pedagogical practices and their use as a resource to enhance educational processes. From the mid-80s onwards, and as Figueiredo says:

The educational use of computers is now beginning to enter a maturity phase clearly supported by pedagogical reasons, both in terms of the design of educational software and in terms of strategies for the use of computers in formal and informal school learning environments (1989, p. 80.)

The 1990s saw the Internet arrive in Portugal with different programs that spread the computers in different Portuguese schools. In the 2000s, educational environments were reconfigured due to the growth of virtual environments that allowed new interactions within the school with other schools, creating collaborative networks and even the "deterritorialization" of the school and educational processes.

There was support for the acquisition of different equipment, either by teachers or students, equipping schools with computers, Internet connections, projectors, interactive whiteboards, teacher training and also the development of programs to promote students' digital competence. (Figure 1).

Figure 1

Timeline of Portuguese and European programs on digital technologies in education
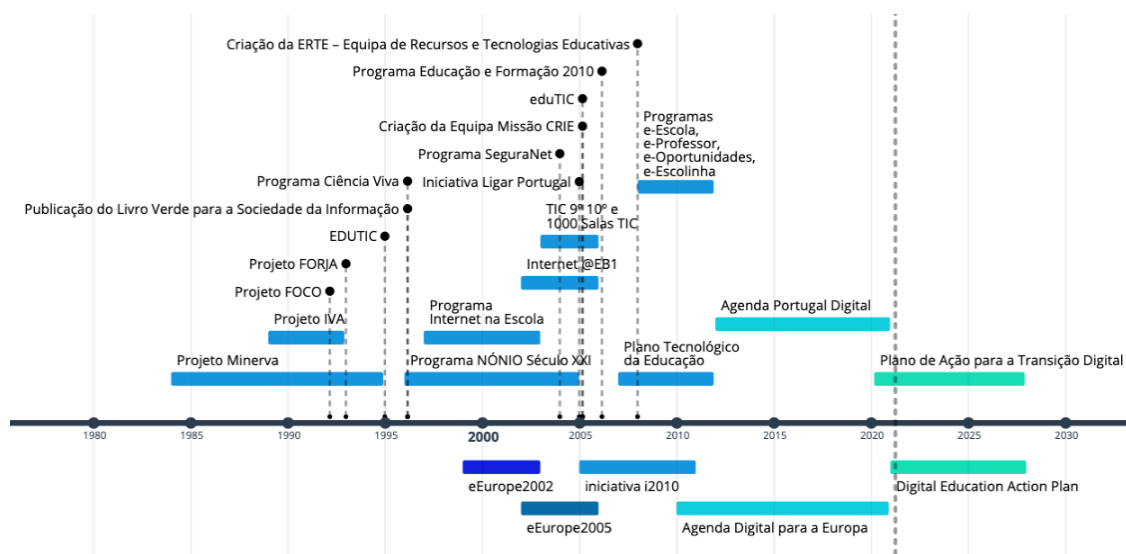
The rapid evolution of computers, especially in the last 20 years, and the possibilities they provide, particularly with the development of the Internet, has changed practices. In fact, "the learning approach and the teaching of methodological solutions begin to integrate other pedagogical paradigms, in addition to those with a behavioral and cognitive base, thanks to the circularity that allows communication between actors in real time" (Rosenberg, 2001, p. 25-29). However, Rosenberg affirms that "the history of the use of electronic technology for learning in the school environment is full of promise and failure" (2001, p. 26), wondering if the Internet could change this situation.

On the one hand, information and communication technologies were born from the Portuguese curricular reforms of the early 2000s to integrate pedagogical practices and contribute so that school culture plays its role in the computerization of society (Pinheiro & Correia, 2014). On the other hand, we come to the year 2020 with the obligation of teaching completely online during the periods of confinement generated by the COVID19 pandemic, both in Portuguese and international schools, with visible weaknesses in the teaching and learning process in relation to the pedagogical use of digital technologies and existing resources (Dias-Trindade et al., 2020).

In spite of everything, it is considered that the spread of the Internet has allowed a new stage in terms of the incorporation of technology in schools, especially with the development of the web 2.0 and the development of a set of resources that not only allowed the development of collaborative and networked work (Bassani & Barbosa, 2018; Selwyn, 2010), mentioned above, but also a change in school culture towards an era of "prod'users", that is, a culture in which students actively participate, create content that then also use, build, co-build and expand their knowledge from the information they collect in their educational activities.

In the framework of the COVID-19 pandemic, the Council of Ministers of Portugal approved the Action Plan for the Digital Transition, which is assumed as "the engine of transformation of the country" (Council of Ministers, 2020, p. 8), and which aims to implement a varied set of measures to allow its digitization. These measures are organized into three main pillars, the first dedicated to digital training and inclusion, incorporating digital education, requalification, and vocational training.

In the context of digital education, one of the objectives for the training of young people is the "transversal integration of technologies in the different curricular areas of primary and secondary education" (Council of Ministers, 2020, p. 12), having that transversal training is appropriate for the skills of the 21st century where the role of technology, as mentioned in 2015 by the World Economic Forum, will be fundamental to guarantee social and professional equity for everyone in the world. Among the measures to be adopted, teacher training is the sub-pillar that refers to requalification and specific professional training. Naturally, it will be essential for an effective integration of technologies in educational practices.

In fact, teacher qualification is essential for effective integration of digital technologies in schools (Alves et al., 2019; Aşık, et al., 2020; Gutiérrez-Fallar & Henriques, 2020; Ricoy & Couto,

2011; Rodrigues , 2020) throughout the educational process in order to create an integrated culture aware of the potential that the digital technologies have in the present and future of young students, with the Portuguese government committed to monitoring the European reality and aware that digital skills are essential to increase the country's capacity and the degree of competitiveness (Council of Ministers, 2020; Government of Portugal, 2017; Ministry of Economy and Digital Transition, 2020).

However, it is important to understand how this path has been built in Portugal, how the entry of computers into schools and, more recently, the spread of the digital signal has contributed to changing practices.

3. THE STUDY

The work presented here is based on the methodology of systematic literature review, following the methodological procedures recommended by Petticrew and Roberts (2006).

3.1. DELIMITATION OF RESEARCH QUESTIONS

The study carried out has the following research question: What pedagogical experiences with technologies have been carried out in Portugal between 1975 and 2021 in Basic and Secondary Education?

In this sense, some questions were outlined that served to define the corpus of articles to be selected:

Q1 - What technologies have been introduced into schools since 1975?

Q2 - What kinds of pedagogical experiences were the teachers developing?

Q3 - What is the teachers' opinion on the use of technologies in an educational context?

Q4 - What is the relationship between the diffusion of these technologies and the training of teachers for their use?

3.2. CHOOSING THE SOURCES OF ACCESS TO THE DATA

For data collection, the SCOPUS and Web of Science databases were selected, considering that they are spaces for scientific and academic dissemination of excellence. After the first data collection, these sources referred us only to more recent texts, which is why the SCIELO database was added as it could add relevant data in the period referred to the initial decades of the study.

3.3. KEYWORDS DEFINITION

The defined keywords (in Portuguese and English) sought to encompass the different aspects that were intended to respond, that is, the introduction of technologies and different digital resources, either from the perspective of education in general or related to the process teaching and learning, and also on the digital competences of teachers. Table 1 presents the number of results found.

Table 1

Keywords for search

String	SCOPUS	Web of Science	SCIELO	Total
Technology AND Education	520	99	204	823
Tecnologia AND Educação	3	1	55	59
Technology AND Teaching	244	21	149	414
Tecnologia AND Ensino	1	0	70	71
Technology AND Learning	270	74	175	519
Tecnologia AND Aprendizagem	1	0	53	54
Digital AND Education	158	54	181	393
Digital AND Educação	0	0	66	66
Digital AND Teaching	111	13	113	237
Digital AND Teaching	1	1	71	73
Digital AND Learning	147	62	149	358
Digital AND Aprendizagem	3	0	58	61
Audiovisual AND Education	54	3	11	68
Audiovisual AND Educação	1	0	2	3
Audiovisual AND Teaching	21	0	11	32
Audiovisual AND Teaching	0	1	4	5
Audiovisual AND Learning	5	2	9	16
Audiovisual AND Aprendizagem	0	0	4	4
Digital environment AND Education	14	1	31	46
Ambiente Digital AND Educação	0	0	4	4
Digital environment AND Teaching	12	0	14	26
Ambiente Digital AND Teaching	0	0	4	4
Digital environment AND Learning	18	1	20	39
Ambiente Digital AND Aprendizagem	0	0	4	4
Game AND Education	113	32	26	171
Jogo AND Educação	1	0	19	20
Game AND Teaching	84	7	14	105
Jogo AND Teaching	5	0	17	22
Game AND Learning	113	66	23	202

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Jogo AND Aprendizagem	3	0	17	20
Digital competence	7	6	27	40
Competência digital	0	2	28	30
Digital literacy	55	13	32	100
Literacia digital	0	0	3	3
TOTAL	1965	459	1668	4092

3.4. STUDY SELECTION

The studies were selected according to a set of previously defined inclusion and exclusion criteria, which served as the basis for the analysis of the titles, abstracts and keywords of the collected articles. An initial search criterion referred to the exclusive collection of articles from peer-reviewed journals related to activities carried out in Portugal or by Portuguese authors in the period between 1975 and 2021.

Inclusion criteria:

Inc1- The study reports experiences of the use of educational technologies in an educational context

Inc2- The study presents a theoretical reflection on the use of educational technologies

Inc3- The study discusses the digital competences necessary for the use of technologies in educational contexts

Exclusion criteria:

Exc1- The study does not concern research carried out in Portugal

Exc2- Repeated study

Exc3- The study is not about non-higher education

Exc4- Studies not available for access

Exc5- Studies with irrelevant content for the research context of this work

After applying these criteria, 66 papers were selected from the set of 4092 results found, as shown in Table 2.

Table 2

Selected and excluded results (1st. Stage)

Data Base	Total Publications	Excluded					Total of selected studies
		Exc1	Exc2	Exc3	Exc4	Exc5	
SCOPUS	1965	1680	148	35	1	91	10
Web of Science	459	10	155	71	5	172	46
SCIELO	1668	1586	58	3	1	10	10
TOTAL	4092	3276	361	109	7	273	66

In a second phase, a more detailed study was carried out and the articles were analyzed in their entirety. This resulted in the exclusion of ten texts from the Web of Science, one from SCOPUS and one from SCIELO, as it was determined that they were not in the research context (Exc5). Four studies were excluded from the Web of Science list for referring to repeated content related to the same projects (Exc2). One text was excluded from the Web of Science list because it was not related to non-higher education (Exc3). Two texts were excluded from the Web of Science because they did not contain information related to Portugal (Exc1) (Table 3). By excluding the aforementioned texts, the corpus to be analyzed resulted in a total of 47 articles.

Table 3

Final table with selected and excluded results

Data base	Total Publications	Excluded					Total of selected studies
		Exc1	Exc2	Exc3	Exc4	Exc5	
SCOPUS	1965	1680	148	35	1	92	**9**
Web of Science	459	12	159	72	5	182	**29**
SCIELO	1668	1586	58	3	1	11	**9**
TOTAL	4092	3272	365	110	7	285	47

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4. RESULTS

The selected texts were rigorously analyzed in order to understand which were more focused on the teacher and which were more focused on the student. It was concluded that this distribution was almost equivalent (Table 6) with 24 studies focused on the teacher (51.1%), 18 studies focused on the student (38.3%) and 5 studies (10.6%) that articulate the teacher-student relationship in the experiences presented.

Furthermore, it was found that 35 texts (74.5%) present empirical studies, while only 12 texts (25.5%) follow a literature review or theoretical essay methodology.

Regarding the connection of these works with the research questions, the studies focused on student learning reflect the experiences and their effects on these learnings and on the modification of practices, increasingly associated with the production of knowledge, that is, increasingly articulated with an idea of "prod'use" of resources at the service of learning.

In the case of teachers, the fact that there are several texts related to their training in the use of technology stands out (34%), to then divide them between studies that present different technologies or present practices carried out with different digital technologies (Table 4).

It should be noted that there are two studies included in the second quarter that already refer to experiences during the period of the pandemic.

Table 4

Approach of the studies selected by research question

(N=47)	Student		Teacher		Student and Teacher	
	F	%	F	%	F	%
O1	10	21.3	7	14.9	3	6.4
O2	14	29.8	5	10.6	3	6.4
O3	16	34.0	8	17.0	4	8.5
O4	0	0.0	16	34.0%	0	0.0

5. DISCUSSION

5.1. INTRODUCING TECHNOLOGIES IN SCHOOLS SINCE THE DEVELOPMENT OF COMPUTERS

In Portugal, starting in the 1980s, technological innovations associated with computer science and programmed teaching expanded, partly as a result of the development of government programs such as those mentioned in point 2.

There are several studies from the 80s and 90s that show the introduction of a diverse set of equipment:

> - Linked to audiovisual, with technological innovations of audio and video such as cassette recorders and players and later on CD and DVD.

> - Linked to the introduction of computers themselves in schools, in coordination with government programs to support the acquisition of this equipment, both for schools and for teachers and students.

> - Linked to multimedia and, as Silva (1993) refers, focused on the construction of the multidimensional scenario

and the cognitive representation of knowledge.

The Internet and the speed of technological innovations of the 21st century quickly reached the Portuguese classrooms. First, computers, video cameras, cameras, projectors and printers have become devices that exist in many schools, mainly in instrumental use, "as a specific study objective in certain subjects [...], as an aid or tool for the study of other disciplines [...] as support for management and administration activities, not specifically for teaching" (Henriques et al., 2012, p. 11).

More recently, interactive whiteboards, laptops (highlighting the example of the Magalhães computer) and mobile technologies, such as smartphones and tablets, and even the use of robots have been introduced.

However, it is necessary to understand how these items have been integrated into teaching practices.

5.2. PEDAGOGICAL EXPERIENCES DEVELOPED BY TEACHERS

With the development of technologies, their use becomes more complex, with an emphasis on what students can do with these different resources. Among the selected texts and as mentioned in point 3, the studies presented have their focus on the development of learning and the improvement of transversal skills. These also reveal some concerns for the development of digital competences of students (Martins and Fernandes, 2015; Pinto and Osório, 2019) and their media literacy (Costa et al., 2018).

Although some of the studies are carried out with specific educational levels, the skills worked and the objectives set can easily be adap-

ted to other study cycles, since they focus on the use of technology as a means for the development of both disciplinary activities.

The resources presented in these studies are, in fact, quite varied. For example, the use of digital books to develop reading and interpretation skills (Gonçalves & Almeida, 2016), digital manipulatives (Sylla et al. 2015), podcasts (Coutinho & Mota, 2011) or social networks that enhance the development of informal learning (Moreira et al., 2019).

It is true that gamification is the most presented strategy (it represents 41% of the approach of studies that present pedagogical experiences), with or without the use of mobile technologies and even including a new form of interaction: augmented reality. As Student and Dietrich (2020) refer, it has increasingly become a reality, mainly as a result of the democratization of mobile technologies.

In fact, tablets and smartphones found their way to help the development of teaching and learning activities, appearing clearly in 27% of the experiences reported in these studies.

There are examples among the selected studies that clearly demonstrate the diversity of possibilities that the complexity of both the equipment and the software itself have allowed. For example, augmented reality and digital manipulatives (Sylla et al., 2015), the use of storytelling or activities such as those presented by Rodrigues and Bidarra (2014) that use different platforms.

As Almeida (2018) points out, there are still several teachers who use digital technologies as a teaching support and not so much as a practical learning support that have significantly changed the pedagogical approach. They do not provide a real innovation or reconfiguration of the educational process.

5.3. OPINION ON THE USE OF TECHNOLOGIES IN AN EDUCATIONAL CONTEXT

Among the studies analyzed, there is a tendency (28.6% of the texts) to associate technologies with either high levels of motivation and satisfaction (Barros et al., 2020; Gonçalves & Almeida, 2016; Faria et al., 2019), or with a more effective learning (22.5% of the texts) (Santos & Alves, 2017).

The positive aspects are varied, considering that the active participation of the students helps to increase the sense of self-esteem (Pinto & Osório, 2020), allows a better communication between the actors in the educational process (Fartura et al., 2014) and it also improves knowledge exchange (Moreira et al., 2019). As Gonçalves and Almeida (2016) point out, new ways of teaching are configured, but also new ways of learning.

Costa et al. (2020) highlight that, for example, the use of augmented reality contributes to a different experience, bringing students closer to a "real experience" and combining the playful side of these strategies with learning.

There are references from Fernandes et al. (2016) and Moniz et al. (2021) regarding the importance of the teacher as a mediator of all these activities, not only in their planning, but also in their implementation.

5.4. RELATIONSHIP BETWEEN THE DISSEMINATION OF THESE TECHNOLOGIES AND TEACHER TRAINING

The lack of teacher training has long been pointed out as a justification for an incipient, conservative or instrumental use of technologies in the classroom, which is why it is recognized as essential.

The fact that the Teaching Career Statute guarantees teachers regular access to continuous training to update and improve their knowledge and professional skills and, especially since 2007, the fact that continuous training in ICTs has been considered a priority (Ricoy & Couto, 2011), greatly increased the offer and, of course, the participation.

However, the initial training of teachers does not require the existence of curricular units related to educational technologies, although the legislation indicates that initial training must include an area of general educational training that encompasses "the knowledge, skills and attitudes common to all relevant teachers for their performance in the classroom" (Decree-Law No. 79/2014, of May 14, art. 9, p. 2891) Thus, despite the concern that initial training teaching is a reality (Aşık, et al., 2020; Gutiérrez-Fallar & Henriques, 2020; Ricoy & Couto, 2011; Rodrigues, 2020), it is observed that it is still insufficient (Ricoy and Couto, 2011).

Regarding training for the use of technologies, Gutiérrez-Fallas and Henriques (2020) and Sampaio (2016) highlight the need to organize training according to the TPACK model, "presenting both pedagogical and technological concerns, considering the context of each teacher and respective students" (Sampaio, 2016, p. 223).

In addition, there is also a frequent preference for training courses that have a relatively long duration, since it allows a better understanding of the effect it has on the teaching practice. Thus, the authors of these works manage to verify that the apprentices are beginning to modify their practices, promoting more active and dynamic classes and that they are beginning to make use of technologies as a means for the development of innovative, dynamic and active learning (Carlos et al. al. al., 2018; Montez & Ai-

res, 2013; Sampaio, 2016), although they consider that these changes do not occur overnight, but rather are slow processes that need "a certain maturation to generate transformation" (Sampaio, 2016, p. 222).

More recently, the relevance of the topic of digital teaching competences has been more evident, the DigCompEdu framework developed by the European Union being one of the most prominent. Based on this framework, the European Union developed a self-assessment questionnaire on digital teaching competences (the DigCompEdu CheckIn), which was subsequently validated for the Portuguese population by Dias-Trindade et al. (2019). In the same way, Sampaio (2016) mentions the importance of a training more focused on specific scientific areas, or in an articulation between pedagogy, content, and technology. What this questionnaire allows, as mentioned by Dias-Trindade and Ferreira (2020), is that each teachers can "define which of the trainings they should take, even investing first in those in which they have encountered the greatest difficulties and advancing according to their interests to evolve at their own pace towards achieving digital fluency" (p. 181).

The study carried out in Portugal using this questionnaire (Dias-Trindade & Moreira, 2020) showed, for example, greater weaknesses in terms of more articulated competences with adaptation to the different needs of students. Greater difficulties arise to adapt to the digital context when referring to feedback, self-regulated learning and adaptation of learning, that is, practical work according to the needs of the students. On the other hand, the competences related to the individual work of a teacher, with a reflective and planning practice, are those that collect, on average, the highest results (Dias-Trindade & Moreira, 2020). The study by Ricoy and Couto (2011), also based on the Di-

gCompEdu framework, shows that there are some gaps in practices related to digital security among participants who are still in initial teacher training.

Having made this reflection, it is also important to highlight the two studies published in the context of a pandemic. Dias-Trindade et al. (2020) provide an overview of the transition from a face-to-face regime to remote emergency education in Portugal (compared to Brazil as well). In turn, Moreira et al. (2020) reinforce the need for teacher education and training for digital educational contexts.

6. CONCLUSIONS

With the technological advances of the last 60 years, computers have become increasingly powerful and portable. With the arrival of the Internet, they can be interconnected and have recently been associated with new mobile digital equipment that allows, as recognized in the studies analyzed, greater interactivity and participation based on methodologies that teachers can promote.

However, many authors acknowledge that the use given to the technologies that have entered schools (computers, projectors, interactive whiteboards, tablets, among others) has been conservative and little associated with innovative practices. But they also point out that for renewal to take place it is necessary to invest in training to provide teachers with digital competences that allow them to use technologies with pedagogical intentions.

Since the 1980s, there have been many projects that Portuguese governments have developed in association with European projects to digitally train teachers and even to equip schools and the school community. However, when analyzing the sample collected for this

study, it seems that there is still a long way to go, which, for several authors, should begin with initial teacher training.

In general terms, these works show the evolution that technology has had in an educational context, although it must be recognized that it is slower than desirable. However, in the last 20 years there has been a more effective use of technology by students, pointing to an increasingly active and participatory learning, which may lead us to consider that this more recent stage in the relationship between technologies with school is becoming an era of "prod'users", where students interact with technologies and their teachers to learn and expand their knowledge, also contributing to the production of new content in a constant interaction between production and use. As Oliveira (2020) affirms, it is essential to think of a "School that makes learning, instead of teaching, where the student is the builder of his life project. [...] A School where digital skills are transversal and where the student is a user / producer of technology" (p. 497). Hence the importance, also, of developing digital competences not only for teachers, but also for students.

The pandemic that began in 2020 made the needs more visible and accelerated the process of digitizing schools, a process that was already underway in Portugal within the framework of Portugal INCoDe.2030 (National Initiative for Digital Competences e.2030), initiated in March 2017, and that in April 2020, on the path of digital training in the country, reinforces the commitment to Digital Education through Resolution of the Council of Ministers No. 30/2020. This resolution approves

the Action Plan for the Digital Transition, which includes a strategic area focused on "Capacity and digital inclusion of people" through Digital Education and provides a digitization program for schools that includes the commitment to a digital training plan for teachers, in addition to the access to digital resources and equipment.

This is in line with the idea of a digital school where teaching and learning processes are increasingly enriched with digital technologies and where humans and non-humans interact collaboratively with the objective of teaching, learning and building knowledge in an active and participatory manner. This is the objective of the Portuguese school, a school that makes use of technology and digital elements to bring "students closer to the productivity and collaboration tools that they can find in a professional work environment" (Resolution of the Council of Ministers noº 30/2020, p. 15), that is, a fully developed school in an era of "prod'users".

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Digital competencies of educators: from praxis self-assessment to training needs

Competências digitais dos professores: da autoavaliação da práxis às necessidades formativas

Competencias digitales del profesorado: de la autoevaluación de la praxis a las necesidades formativas

6

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Abstract

Today's connected society demands digital competence from teachers in their pedagogical work. This study analyzes the digital competence required for teachers, based on the common self-assessment framework of digital competence of teachers (DigCompEdu). Using a quantitative approach, the DigCompEdu CheckIn self-assessment scale was applied to 145 Brazilian teachers in the first years of primary school. The teachers obtained a score of 40.9 points, classifying them as B1 - Integrative, revealing gaps in their professional and pedagogical competence, as well as in the development of the competence of the students. It is urgent that teacher training includes the pedagogical use of technologies as drivers of learning and the emancipation of students.

KEYWORDS

Digital competence, Teachers, DigCompEdu, Teacher training.

Resumo

A atual sociedade conectada demanda dos professores competências digitais no seu fazer pedagógico. Este estudo analisa as competências digitais requeridas para os professores, baseando-se no quadro comum para a autoavaliação das competências digitais dos professores (DigCompEdu). Com abordagem quantitativa, aplicamos a escala de autoavaliação DigCompEdu CheckIn com 145 professores brasileiros dos Anos Iniciais do Ensino Fundamental. Os professores alcançaram escore de 40,9 pontos, classificando-os como B1 – Integrador, revelando lacunas nas suas competências profissionais e pedagógicas, bem como no desenvolvimento das competências discentes. Urge que a formação docente contemple o uso pedagógico das tecnologias como promotoras da aprendizagem e emancipação dos estudantes.

PALAVRAS-CHAVE

Competências digitais, Professores, DigCompEdu, Formação docente.

Resumen

La actual sociedad conectada exige competencias digitales a los docentes en su labor pedagógica. Este estudio analiza las competencias digitales requeridas para los docentes, a partir del marco común de autoevaluación de las competencias digitales de los docentes (DigCompEdu). Con un enfoque cuantitativo, se aplicó la escala de autoevaluación DigCompEdu CheckIn a 145 docentes brasileños de los primeros años de la escuela primaria. Los docentes obtuvieron una puntuación de 40,9 puntos, clasificándolos como B1 - Integrador, revelando brechas en sus competencias profesionales y pedagógicas, así como en el desarrollo de las competencias de los estudiantes. Es urgente que la formación docente incluya el uso pedagógico de las tecnologías como impulsoras del aprendizaje y la emancipación de los estudiantes.

PALABRAS CLAVE

Competencias digitales, Docentes, DigCompEdu, Formación docente.

Digital competencies of educators: from praxis self-assessment to training needs

1. INTRODUCTION

The COVID-19 pandemic, caused by the SARS Cov-2 coronavirus, threw teachers and educational institutions around the world into virtual learning spaces, demanding the development or improvement of digital competence with a view to the continuity of educational activities, in amid the chaos of the health crisis caused by the pandemic.

In this disruptive context, knowing how to use the pedagogical potential of digital technologies has become a condition for teachers, especially when considering the methodological specificities of online teaching and, above all, avoiding the mere transposition of pedagogical practices from face-to-face, facing the school space to the virtual "universe".

It is noteworthy that the need to use digital technologies to support pedagogical mediation in the teaching and learning process precedes the demands of the COVID-19 pandemic. It is important to remember that the debates in the 1990s in Brazil about the "New Technologies in Education", later called "Digital Information and Communication Technologies", did not fully reach the basic educational units through continuing education or even the initial preparation derived from teacher training courses in Brazilian universities.

On the other hand, the distance education modality has long used the potential of emerging digital technologies successfully in the teaching and learning process. Hernandes (2017) affirms that the unidirectional relationship used previously in traditional distance education models evolved with the emergence of online education, since digital technologies allowed a high level of dialogic interaction between educator and student, allowing "virtual encounters among all the participants in the educational process in the social network" (p. 287).

However, although the use of digital technologies is not something new in the field of Education, the pandemic has opened gaps in the digital competence of educators, since many were not prepared to implement teaching methodologies in accordance with the specificities of the educational cyberspace, as revealed by the studies of Dias-Trindade & Santo (2021).

Now, the Common National Curriculum Base (BNCC), by establishing the recommended learning for Basic Education in Brazil, defines that pedagogical decisions must be based on the development of competencies through the selection, production, application and evaluation of teaching resources and technologies to support the teaching and learning process, so that students are able to critically use digital technologies "in various social practices (including school) to communicate, access and disseminate information, produce knowledge, solve problems and exercise leadership and authorship in personal and collective life" (Brasil, 2017, p. 9).

Given the above debate, this study aims to analyze the digital competence demanded by teachers from the self-reflection of their educational praxis and mapping the gaps that arise in order to propose indicators for continuing teacher training. The research is based on the proposal of the common framework for the self-assessment of digital competence of educators (DigCompEdu), prepared by the Science and Knowledge Service of the European Commission (EU Science Hub), presented by Redecker (2017).

Thus, this study is descriptive research with a quantitative approach, using the self-assessment scale of digital competence of educators (DigCompEdu CheckIn) as a data collection

instrument. It was carried out between 2020 and 2021 with 145 Brazilian basic education teachers who were working in the first years of primary school (1st to 5th year).

2. TECHNOLOGIES, DIGITAL COMPETENCE AND TEACHER TRAINING IN BRAZIL

To understand the training gaps oriented to the pedagogical use of digital technologies, it is important to know the context of the training of teachers who work in the first years of primary school in Brazilian public schools. Throughout the 20th century, what predominated in teacher training courses in Brazil was training based on the ideal of technical rationality. This rationality hierarchized the knowledge learned in the academy, making the future professional of education a teacher who reproduces knowledge historically selected by textbooks and hegemonic pedagogical material (Lima, 2019).

From this perspective, we can ask ourselves: does the training of these future teachers permeate the pedagogical uses of technologies? Faced with this question, we can argue that in a country where there are still a large number of lay teachers (without specific training for teaching), the answer is negative.

Studies carried out in the first decade of the current century show us that:

> 22% of the 2,101,408 Brazilian professors (450,874) did not make it to university. Of this total, 8,339 completed only primary education, 115,456 completed regular secondary education, and 335,418 completed teacher education. Among the 1.6 million graduates, 223,777 did not complete a degree, a modality that prepares teachers. (Figueiredo, 2013, p. 88)

When analyzing the curricular structures of the undergraduate courses responsible for the training of future teachers at the Federal University of Reconcavo da Bahia, located in Reconcavo Baiano, Brazil, we infer that when this debate is discussed it is through a specific discipline, generically called Information and Communication Technologies, which is not mandatory. In this sense, there is no concern to train teachers prepared to mediate the learning of digital native children in a technological society.

So, how can we expect in a context in which we need a lot of technological knowledge, interrelated with pedagogical, curricular and content knowledge, that teachers in this stage of Basic Education can become "silently" mediators of online learning through of virtual environments? There is no way to demand from a professional an undeveloped skill in their initial teacher training courses.

> In their survey on teacher training and related policies, Gatti, Barreto and André (2011) showed that the training offered to teachers is, to a great extent, neglected and offered in a timely manner and far from the reality of teachers. (Souza and Schneide, 2016, p. 419)

However, there has been some investment in the acquisition of televisions, computers, image projection equipment, and the installation of computer labs by successive Brazilian governments since the late 20th century. At the same time, there was no adequate training in higher education courses, either in the context of initial training or in the field of postgraduate courses (Master's and Doctorate) focused on the area of Education, therefore, teachers are not prepared to appropriate these spaces and their full potential.

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In the field of postgraduate studies and referring specifically to the specialization courses known in Brazil as lato sensu postgraduate courses, there are still a very insignificant number of courses focused on the debate on Digital Technologies and their uses in education in public and superior institutions.

In light of this, technology investment for schools over the years has become futile to some extent, as teachers are often unprepared or have difficulty bringing technologies into their classrooms. Such difficulties prevent the transformation to a teaching in which knowledge is built collaboratively and that considers the prior technological knowledge presented by children of the 21st century, compared to traditional teaching based purely on technique.

Lima (2019), considering the studies of Tardif (2011), tells us that knowledge learning is slow and complex.

> [...] Consequently, an adequate formalization and systematization in the teaching process is required for the learning process to take place, conceiving teacher training as something fundamental for the production and updating of this knowledge. (p. 67)

Research such as that of Lima (2019) shows us the fragility of the training of teachers who work in the initial years of primary education in Brazil, when considering curricular and specific knowledge of areas of knowledge, since these teachers are considered multidisciplinary teachers, that is, they are in charge of teaching the different subjects that make up the curriculum of this teaching stage.

Also considering the study by Lima (2019), it is possible to observe that the informant teachers do not mention technological knowledge, since they are neglected in their pedagogical practices, either due to the total lack of initial training in their higher education courses, or because of the invisibility of the need to constitute a pedagogical practice also supported by the use of technologies, or even by the absence of material conditions (computers, internet, laboratories) for technologies to be present in everyday school learning.

Thus, initial training for the pedagogical use of technologies carried out in an innovative, meaningful and instigating way for learning continues to be a challenge in the face of the so-called globalized knowledge or information society. The absence of this training, therefore, affects teachers who are illiterate in knowledge and media and information skills, a fact even more evident in the context of the COVID 19 pandemic.

These teachers, digital migrants, according to Figueiredo (2013) will not be able to empower their students, digital natives, to use cyberspace, internet, programs, games, television, radio, among others, so that they develop diverse competence and abilities to become in critical and well-informed citizens.

Given this, one wonders: what are the digital competence that teachers who work in the first years of primary school should have? This will be the topic that will be discussed next.

Even considering the polysemy of the term digital competence with different approaches in different contexts, in this study we consider the concept presented in the Sales & Moreira (2019) studies when they state that:

> [...] digital competence is the sensory, cognitive, motor and affective exercise of skills, values, knowledge, information, experiences of the subjects in practices of knowledge, recognition and use of digital and connected ICT,

in order to make decisions, pose attitudes and act autonomously in the processes of intervention, mediation and resolution of problems derived from the context of the learning society, enabling transformation, social, political and economic change in the different daily lives and sectors of the society, including education. (p. 18)

In this sense, the digital competences of teachers go beyond the fetishism of the technique of knowing how to use digital interfaces in the educational context, since it is necessary to reflect on their pedagogical intentionality aligned with the socioeconomic, cultural and political context in which students and educators are inserted, as highlighted by Pesce (2014).

Therefore, the digital competence of educators include all pedagogical activities with the support of digital technologies in environments and other virtual learning spaces, enhancing the teaching and learning process. In the words of Dias-Trindade & Ferreira (2020), digital teaching competence constitute a process of evolution from literacy to digital fluency, stating that:

> [...] This construct naturally encompasses the ability to work in digital environments, associating the pedagogical component with the technological and digital component. However, this "digital competence" must materialize in the ability to mobilize knowledge and attitudes for an effective use of digital technology in a professional context. (p. 169)

Thus, in this pandemic beginning of the 21st century, initial (undergraduate courses) or continuous teacher training (postgraduate courses and throughout life) cannot ignore the development of specific competencies for digital

technologies as a support for pedagogical mediation. In addition to the potential of digital technologies in the educational process, we must also consider that both students and educators are inserted in a hyperconnected society with the thumb up (Serres, 2015), despite the lack or deficient access to broadband internet, unfortunately continues to be part of daily life in many contexts of population marginalized by public policies.

However, the mere access to computers and digital devices connected to the internet does not ensure the development of digital competence, because as Santos (2019) states, in the context of online teaching, it is essential that teachers know to "[.. .] seek and process information online, transform information into knowledge, communicate online, produce texts in various languages and support [...] "(p. 19), demanding skills that go beyond technicalities and are capable of leading them to digital fluency that promotes the emancipation of students who are inserted in a hyper-connected and networked society.

On the other hand, even considering that the majority of students are from a generation called digital savants (Prensky, 2012), facing the sea of information available online, they increasingly need the pedagogical mediation of teachers to help them extrapolate the use of technologies beyond social entertainment and knowing how to "extract meaning from information, understand the difference between what is important and what is not, and above all, combine the multiple fragments of information in a broad image of the world", in Harari's words (2018, p. 322).

Especially in these times of pandemic and given the complexity of liquid modernity introduced by Bauman (2001), teachers are required to continuously develop and improve their digital

competence, so that they can use digital technologies to promote learning and the critical and reflective emancipation of education. Certainly, a huge challenge that teachers cannot avoid!

Regarding the evaluation instruments that seek to map the stage of development and improvement of the digital competence of educators, we find in Brazil the so-called "Matrix of Digital Competences CIEB", elaborated by the Center of Innovation for Brazilian Education (CIEB). The matrix consists of a teacher self-assessment scale subdivided into 3 (three) areas, that is, pedagogical, digital citizenship and professional development, providing subsidies capable of guiding the development of teachers' digital competence, Sales & Moreira clarify (2019).

Figure 1

Digital competences of Educators (DigCompEdu)

Source: Dias-Trindade, Moreira & Nunes (2019); Redecker (2017)
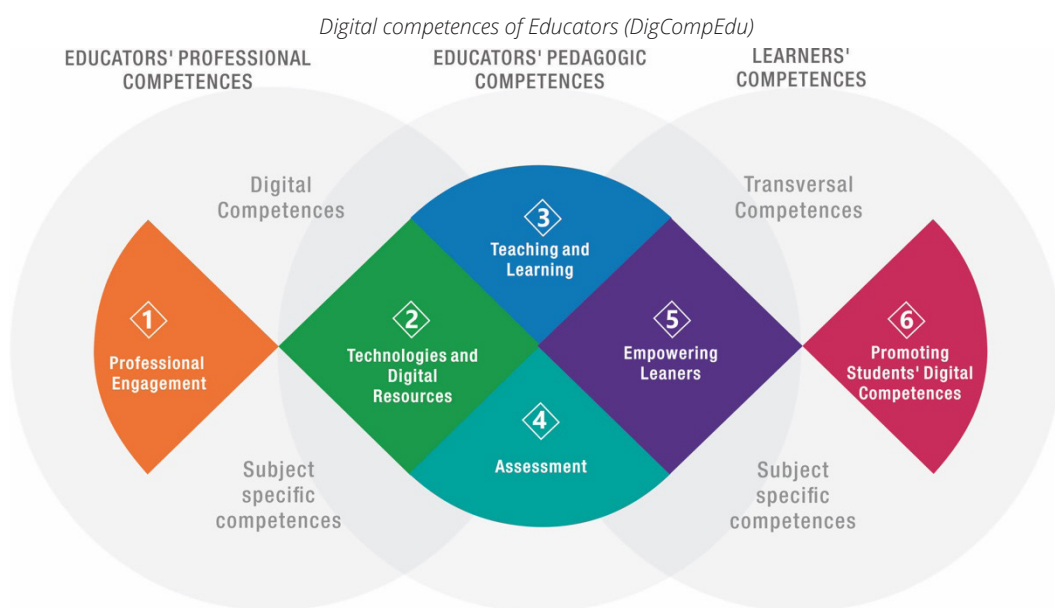
In the European context, the European Commission's Science and Knowledge Service (EU Science Hub) launched in 2017 a Common Framework for Digital Competences of Educators, called DigCompEdu. Based on a theoretical model, DigComEdu considers the specificities of pedagogical practice with the support of the potential of digital information and communication technologies (DICTs) in the teaching and learning process, points out Redecker (2017). In Figure 1, we can see the areas of digital competence covered by DigCompEdu with their developments.

Table 1

DigCompEdu Digital Skill Levels and Areas

Competence Level	Area of competence	Description
Teacher professional competencies	Professional participation	Use of digital technologies to communicate, collaborate and promote professional development.
	Technologies and digital resources	Use of technologies to select, create and share digital resources.
Competências pedagógicas	Teaching and learning	Ability to manage and organize the use of digital technologies in the teaching and learning process.
	Evaluation	Way of using digital technologies to evaluate and / or improve student evaluation processes.
	Student empowerment	Use of technologies to improve inclusion, personalization and student engagement.
Desenvolvimento das competências dos estudantes	Promotion of students' digital competence	Support students in the use of digital technologies in a creative and responsible way.

Source: Adapted from Ota & Dias-Trindade (2020) and Redecker (2017)

In the DigCompEdu model, the digital competence areas are distributed in 3 (three) levels that are subdivided into 6 (six) competence areas, as shown in Table 1.

For the self-assessment of digital competence, the DigCompEdu model is structured in the format of a self-reflective questionnaire, classifying the stage or level of development of digital competence based on the score obtained, as detailed in Table 2. In addition, it provides individual feedback with suggestions to improve teaching practice, enriched with the use of digital technologies (Dias-Trindade & Santo, 2021).

We observe that the DigCompEdu teacher digital competence self-assessment model goes beyond mere mapping of the level at which teachers are, as it provides guidance feedback so that they can advance to later levels, in the face of digital fluency. The authors Dias-Trindade and Ferreira (2020) affirm that the questionnaire also allows evaluating what type of training may be the most appropriate for each teacher, that is, the areas in which they need to dedicate themselves to their continuous training, as well as those in which they approach a level of digital fluency.

Table 2

Levels of digital competence in the DigCompEdu model

Competence Level	Profile
A1 - Newcomer (up to 20 points)	They assimilate new information and develop basic digital practices in their pedagogical work.
A2 - Explorer (between 20 and 33 points)	
B1 - Integrator (between 34 to 49 points)	They apply, expand and critically reflect on their pedagogical practices with the use of DICTs.
B2 - Specialist (between 50 and 65 points)	
C1 - Leader (between 66 and 80 points)	They share their knowledge, reflect critically and develop new practices with digital technologies.
C2 - Pioneer (more than 80 points)	

Source: Adapted from Dias-Trindade & Santo (2021).

In this study, the DigCompEdu digital competence self-assessment model was used, considering its theoretical contribution and its structuring, in addition to its potential in terms of feedback to teachers, as well as indications of continuous training in the gaps found.

3. METHODOLOGICAL PROCEDURES

This study is configured as descriptive research with a quantitative approach, having as a data collection procedure the survey, operated through an electronic questionnaire. According to Prodanov & Freitas (2013), descriptive research outlines the characteristics of the observed phenomenon, seeking to classify, explain and interpret the facts through standardized data collection techniques.

In this sense, the Brazilian version of the Dig-CompEdu CheckIn scale was used, originally developed within the scope of the EU Science Hub, whose validation for the Portuguese language was carried out by the authors

Dias-Trindade, Moreira & Nunes (2019). It is a questionnaire that includes 21 questions for the self-assessment of digital competence of educators, applicable to all educational levels and subdivided into 6 (six) areas of the DigCompEdu model.

For each of the 21 competencies in the Dig-CompEdu CheckIn instrument, a competency statement or item is submitted and participants must select one of the five options that best characterize their position relative to the statement. The chosen options are scored in a range from 0, for the first answer, to 4 points, for the last, totaling 84 possible points in the instrument, resulting in the classification of the competence score presented in Table 2 (Days-Trindade & Moreira, 2020; Dias-Trindade & Santo, 2021).

It is noteworthy that Dias-Trindade, Moreira & Nunes (2019) carried out the statistical validation of the DigCompEdu CheckIn instrument and concluded that it presents good global indicators of validity "with interpretable factorial structures, thus assuming that they consistently evaluate the variables they intend to measure, constituting a scale capable of contributing to the evaluation of the digital competences of educators" (p. 157).

Study participants were invited to voluntarily access the DigCompEdu-UFRB platform, developed in the EU Survey digital interface, within the scope of the Collaborative Learning Network (RCA). The survey was conducted between the months of March 2020 and March 2021, reaching 145 Brazilian teachers surveyed in Basic Education, all working in the initial years of primary school (EF1), that is, from the first to the fifth year of school.

In compliance with the resolutions of the National Research Ethics Council (CONEP), which establish the Brazilian ethical guidelines for re-

search with human participants, the research project was presented and approved by the Research Ethics Committee (CEP) of the Federal University of Bahia's Reconcavo (UFRB) and approved under the resolution n. 3,582.41.

4. RESULTS

The research had the participation of 145 basic education teachers who constituted the sample for the analysis of this study, being 118 (81.4%) women, 26 (17.9%) men and 1 (0.7%) non-binary.

The participants had a weighted average of 39.8 years, ranging in age from 24 to 63 years. It is noteworthy that 82 (56.5%) respondents were between 32 and 43 years old.

Regarding the training area, the majority come from the Human Sciences area with 93 (64.1%) participants and 36 (24.8%) from Linguistics, Letters and Arts. The rest were subdivided into the areas of Human Sciences, Agriculture, Biology, Sanitary Science, Exact and Earth Sciences.

Regarding continuing education at the postgraduate level, Table 3 shows that 97 (66.9%) participants have a lato sensu specialization course, which indicates interest in training and improvement. In addition, 88 (60.7%) research participants work in the municipal or state public education system, and specialization courses are often required in functional progression plans.

However, the data reveal that 33 (22.8%) participants do not yet have any postgraduate degrees. It is noteworthy that in Brazil, postgraduate courses at the master's and doctoral levels do not have universal access due to limitations in the number of places offered, which results in frequently competitive selection processes.

Table 3

Continuing education of participants (postgraduate)

Postgraduate training	Number of teachers	%
Does not have	33	22,76%
Specialization	97	66,90%
Master's / Ph.D.	15	10,34%

All participants work in the Initial Years of Basic Education in Brazil, with 87 (60%) exercising their teaching activity in the state of Bahia; 12 (8.3%) in the state of Sergipe; 9 (6.2%) in the state of Minas Gerais and the rest is subdivided between the states of São Paulo, Ceará, Mato Grosso, Espírito Santo and Rio de Janeiro.

Table 4

Time of teaching experience of the participants

Teaching time (years)	Number of teachers	%	Accumulated %
Up to 6	53	36,55%	36,55%
6 to 12	35	24,14%	60,69%
more than 12	57	39,31%	100,0%

In Table 4, we observe that the sample included 53 (36.55%) beginning teachers with up to 6 years of teaching experience, as well as 57 (39.31%) teachers with more than 12 years of teaching experience.

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5. DISCUSSION

Considering the data collected with the Dig-CompEdu CheckIn self-assessment instrument, in the general average, the sample of teachers who responded reached an average score of 40.9 points, classifying them in category B1 - integrator.

According to Lucas & Moreira (2018), integrators already use a variety of digital technologies in their practices and are willing to expand their repertoire. However, the authors note that they are at the stage of analyzing which digital interfaces and technologies work best due to the pedagogical methods and strategies they wish to implement. "However, Integrators just need a little more time to experiment and reflect, complemented by collaborative encouragement and knowledge sharing to become Experts" (p.30), the authors state.

The general level of digital competence revealed by the surveyed teachers is consistent with the results found in the studies by Dias-Trindade & Moreira (2018) with a sample of 147 primary and secondary teachers in Portugal. In this study, the average score of the teachers was 49.0 points, classifying them as B1 - Integrator; however, very close to level B2 - Specialist, which starts with 50 points.

A similar classification was also observed with 182 higher education teachers in Brazil, in the Bahia's Reconcavo region with an average score of 41 points, classifying them at level B1 - Integrator (Dias-Trindade & Santo, 2021). Another study with 141 Brazilian teachers of Basic, Technical and Technological Education carried out in the state of Tocantins, reached the same general level of digital competence (Melo, 2019).

These studies of digital competence of educators, using the same DigCompEdu CheckIn self-assessment scale, revealed that teachers from Primary to Higher Education face the urgent challenge of developing and improving their skills with a view to digital fluency in order not to become "digital aliens" integrated in a hyperconnected society.

In Table 5, we observe in detail the average responses for each of the 21 competencies, being the dimensions related to professional teaching competencies and student competence those that present the largest gaps that need to be addressed through continuing education.

When analyzing in detail the average of the competency items, we found that only 1 competency item was considered good (with an average value greater than 2.50 points), related to participation in online training programs, revealing the concern of the sample of teachers with their continuing education. They also present 7 (seven) items with median results (with average values between 2.49 and 2.0 points).

Finally, the survey has a group that has just entered teaching (36.55%) and an older group (39.31%). We highlight, in relation to this data, an important phenomenon: the time of experience in teaching is not, by itself, an indicator of the level of experience or ability to reflect on their teaching practice with the use of digital technologies, because experience is the result of constantly reflect on their pedagogical praxis in a critical way.

Table 5

General results of the sample by level of competence

Dimensão	Área	Item avaliado da competência digital	Média ponderada	Valoração do nível
Professional Teaching Skills	Professional participation	1. Use of different communication channels	2,39	Medium
		2. Continuous digital development	2,01	Medium
		3. Participation in online training	3,12	Good
		4. Find strategies and resources online	2,12	Medium
	Technologies and digital resources	5. Use of technologies in internal / external work	1,87	Low
		6. Security and protection of personal content	2,34	Medium
Teach pedagogical skills	Teaching and learning	7. Teaching	2,21	Medium
		8. Orientation	2,02	Medium
		9. Collaborative learning	1,68	Very low
		10. Active digital methodologies	1,85	Low
		11. Activities with digital content creation	1,78	Low
	Evaluation	12. Self-regulated assessment	1,57	Very low
		13. Various evaluation strategies	1,82	Low
		14. Feedback and planning	1,69	Very low
	Student empowerment	15. Evidence analysis to back up	2,20	Medium
		16. Assistance with technology problems	1,92	Low
Student skills	Promotion of students' digital skills	17. Activities adapted to students	1,72	Low
		18. Guidelines for Identifying Fake News	1,95	Low
		19. Internal / external communication	1,77	Low
		20. Responsible behavior online	1,65	Very low
		21. Solving specific problems with technologies	1,74	Low

Note: scale used to assess the level of the competence item: Good - above 2.5 points; Medium, between 2.49 and 2.0 points; Low, between 1.99 and 1.70 points; Very low, below 1.70 points.

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We observe in Table 5 that the surveyed teachers presented 9 items of competencies at the level considered low (with average values between 1.99 and 1.70 points), encompassing the areas of technologies and digital resources, teaching and learning, evaluation, empowerment and development of the students' digital skills.

In addition, 4 competency items are at the level considered very low (below 1.70 points), that is, I) collaborative learning: encouragement for students to work in groups using digital technologies to generate and document the data that they present; II) self-regulated assessment, through the use of digital technologies that allow students to plan, document and monitor their learning autonomously; III) feedback and planning: use of digital technologies to provide effective feedback and IV) responsible behavior online: recommendations and guidance for students to behave safely and responsibly in online spaces.

Thus, the 4 previously mentioned competence items considered "very low" together with the 9 items classified as "low" constitute the priority points of digital competences in which the surveyed teachers have specific gaps that urgently need to be eliminated through continuing education actions. According to Figueiredo (2013), without the development of such digital skills, teachers will hardly be able to develop in their students the empowerment for the reflective and critical use of cyberspace, promoting learning and autonomy.

Table 6

Relationship of digital skills with teacher training

Postgradua-te training	Number of teachers	Score	Category
Does not have	33	42,5	B1 - Integrator
Specialization	97	39,1	B1 - Integrator
Master's / Doc-torate	15	48,9	B1 - Integrator

As shown in Table 6, the data collected from the responding teachers also revealed that continuing education at the graduate level had a small impact on the ranking of the digital competencies category among teachers with master's or doctoral degrees.

We also observed that taking specialization courses did not significantly affect those who did not take them, since the 33 (22.7%) who declared not having specialization achieved a slightly higher average score with 42.5 points, but close to 39.1 points obtained by the 97 (66.9%) who have specialization, both classified in the category B1 - Integrator.

Also in this context, the 15 (10.34%) respondents who completed a master's degree or a doctorate achieved a score of 48.9 points, also being classified in category B1 - Integrator, but with a result very close to the later level, i.e., B2 - Specialist (from 50 points).

Thus, the data collected points to the fragility of the training (initial or continuous) of the

Brazilian teachers of the initial years of primary education who participated in this study, revealing emerging training needs related to the development of digital skills that lead them to the digital fluency in the face of teaching in a connected and networked society, especially in times of the COVID-19 pandemic.

In this context, "[...] training must provide teachers with useful intellectual tools for understanding and interpreting the complex situations in which they find themselves [...]" (Imbérnon, 2011, p. 42).

In the above scenario, we cannot ignore the level of scrapping of public schools, which often fail to provide the minimum infrastructure conditions so that the teaching plans and their didactic sequences are enriched with the daily use of digital technologies, in words by Lucas & Moreira (2019).

6. CONCLUSIONS

In this study, the digital skills demanded by Brazilian teachers in the early years of primary school were analyzed, especially in light of the pedagogical challenges posed by the COVID-19 pandemic, using the common framework for self-assessment of digital competences of educators as a reference (DigCompEdu).

The survey of 145 teachers showed that they are in category B1 - Integrator. That is, they need more time to experiment and reflect on the use of digital technologies, counting on the encouragement and collaboration of their peers to move forward. The study also revealed that these teachers have emergency gaps, especially in dimensions related to technologies and digital resources, teaching and learning, evaluation, empowerment and development of students' digital skills.

The study pointed out the urgent need for initial and continuing education courses to contemplate the knowledge related to the pedagogical use of technologies in an innovative and meaningful way, promoting learning and the

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emancipation of students, encouraging teachers to a continuous knowledge construction and considering the formative communities (Imbérnon, 2009).

Additionally, the data showed that the impact of initial and continuing education on the development of digital skills is still small, revealing the need for such knowledge to be inserted in a transdisciplinary way in teacher training so that they do not become digital aliens, increasingly excluded from an integrated education connected to the information that circulates at the "speed of light", to which the majority of our students continuously access in the first years of primary school.

In addition to teacher training actions linked to digital technologies for pedagogical practice, it will hardly be possible to achieve satisfactory levels of digital skills for teachers without universal access to the broadband internet network and the provision of equipment for teachers and students, especially those in situations of social vulnerability.

Finally, it should be noted that there is access to technologies and their use by teachers. However, this access and use is precarious if we consider the demands of education and today's society, especially in the context of the pandemic. Let us remember, for example, that this use at a "good" level occurs in dimensions that are limited to acting more in the field of self-training (3.12 - Participation and online training). The gaps are evident in other dimensions in which more active subjects are needed and considering teaching and the use of technologies for this exercise. According to the studies presented and contrary to what is postulated as ideal, we have teachers in education who are still passive in relation to the use of technologies for didactic-pedagogical purposes. For this action to take place in an articulated way with our time, it must combine the traditional exhibition class, the chalk, the blackboard and the physical classroom, for example, with other units of time and place (the virtual) and their available technological potentials. Otherwise, pedagogical practice will be relegated to an anachronism and will lose opportunities to reinvent itself over time.

Let us be careful not to widen the gap of social inequality and access to technologies, which affects Brazil and other poor and developing countries. It is urgent that we have effective public policies for digital inclusion and teacher training.

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OBRA DIGITAL

STUDIES AND RESEARCH

Lifestyle, activism and consumption in environmental influencers on Instagram

Estilo de vida, activismo y consumo en influencers medioambientales en Instagram

Estilo de vida, ativismo e consumo em influenciadores ambientais no Instagram

7

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Abstract

Concern about the climate crisis has generated environmental activism on social media, largely led by influencers. This article addresses the relationship between such activism, lifestyle and personal narratives on Instagram, based on a case analysis of the account @vivirsinplastico. Part of an ongoing qualitative research is presented, the results of which allow us to argue that the figure of the "eco-influencer" opens up a new mode of social activism based on promoting a certain sustainable lifestyle in which images play a fundamental role.

KEYWORDS

Activism, Lifestyle, Influencer, Instagram, Environment, Sustainability.

Resumen

La preocupación por la crisis climática ha generado un activismo medioambiental en las redes sociales liderado en buena parte por influencers. En este artículo se aborda la relación entre dicho activismo, el estilo de vida y las narrativas personales en Instagram a partir de un análisis de caso, la cuenta @vivirsinplastico. Se presenta parte de una investigación en curso de carácter cualitativo, cuyos resultados obtenidos nos permiten sostener, entre otros, que la figura del eco-influencer abre un nuevo modo de activismo social basado en promover determinado estilo de vida sostenible en el que las imágenes tienen un papel fundamental.

PALABRAS CLAVE

Activismo, Estilo de vida, Influencer, Instagram, Medioambiente, Sostenibilidad.

Resumo

A preocupação com a crise climática gerou ativismo ambiental nas redes sociais, em grande parte liderado por influenciadores. Este artigo aborda a relação entre tal ativismo, estilo de vida e narrativas pessoais no Instagram a partir de uma análise de caso, da conta @vivirsinplastico. Apresenta-se parte de uma pesquisa qualitativa em andamento, cujos resultados nos permitem sustentar, entre outros, que a figura do "eco-influencer" abre um novo modo de ativismo social baseado na promoção de um certo estilo de vida sustentável no qual as imagens têm um papel fundamental.

Palavras-chave

Ativismo, Estilo de vida, Influenciador, Instagram, Meio ambiente, Sustentabilidade.

1. INTRODUCTION

Instagram is presented as a communication space in which profiles of influencers can be found whose personal narrative poses a direct relationship between an ecological lifestyle and sustainable consumption. This typology of users suggests a form of activism that has specific characteristics.

The role of the media in the field of environmental awareness has been key for some decades, since it is considered that citizens do not visualize the consequences of environmental deterioration in an immediate way (Olausson, 2011; Östman, 2014). Thus, it is argued that the media are of great value in raising awareness and actions regarding the environment. Although, according to Arlt et al., (2011), these messages are not quite effective, especially when they involve a change in lifestyle that makes us give up certain comforts. According to these authors, the most effective media actions in general can be observed in those cases that use several media: public television news, print media and online information media (Arlt et al., 2011). In this sense, social media would have the potential to activate participation in grassroots environmental movements (Huang, 2016).

Environmental activism promoted by organizations such as Greenpeace has encouraged citizen participation in protest actions and has mostly prioritized the use of negative images of environmental degradation. However, in a study by Leviston et al. (2014) found that images of natural disasters, extreme events and pollution used to have negative responses in the audience, while responses to images that represent climate solutions generated more positive reactions, which is an alternative to the traditional way to communicate environmentalism.

Thus, the potential of the media and social movements in the face of climate change would lie in the ability to promote a stable awareness of climate problems and achieve a change at the level of attitude. In other words, it starts from the idea that, in the long term, the media and mobilizations can indirectly cause changes in consumer preferences associated with a change in lifestyle (Holbert et al., 2003).

In the current communicative context, social media have an essential role, especially Instagram where there are many profiles dedicated to spreading any kind of lifestyles. The objective of this research is to explore the relationship established between personal narratives, lifestyle and environmental activism on Instagram. A set of profiles (with a remarkable volume of followers) dedicated to the dissemination of ecology and sustainability are analyzed using qualitative methods in order to demonstrate the emergence of new forms of activism.

This activism proposes an ecological change starting from the domestic space, based on responsible consumption choices (consumer goods that respect the environment) or on reducing consumption as much as possible as a wearable solution. Thus, the articulation between activism and consumption will be one of the axes of the analysis. On the other hand, on Instagram, the role of the image is essential to support these environmental narratives. In this sense, it is interesting to analyze the emergence of a visual activism and a specific aesthetic that accompanies this movement in this social network.

2. THEORETICAL FRAMEWORK AND STATE OF THE ART

2.1. CELEBRITIES AND ENVIRONMENTAL ACTIVISM ON SOCIAL MEDIA

The presence of well-known people devoted to the environmental cause has a long standing trajectory if we consider Al Gore or Leonardo di Caprio. According to Abidin et al. (2020) although the role of these celebrities is essential when putting some issues on the agenda, in other cases they can contribute to processes of commodification of landscapes or natural environments contributing to consumer capitalism (Abidin et al., 2020, p. 16). In the same way, several recent studies on the influence of Greta Thunberg on young people (Pihkala, 2018) have been carried out highlighting her power of convocation.

However, less attention has been given to the role of new actors within the social media ecosystem, environmental influencers, which we tentatively call *eco-influencers* (Ardèvol et al., 2021). These new media actors, promote a sustainable lifestyle using their own experience and personal narrative to educate and engage with their community of followers. This fact, legitimizes and motivates them not to abandon in this endeavor.

The term *influencer* is developed mainly in marketing studies, such as the case of Pino-Romero and Castelló-Martínez (2017) that analyze the links between brands and influencers, and fashion influencers in Spain (Cuenca-Piqueras, 2021; Segarra- Saavedra & Hidalgo-Marí, 2018).

However, the approach of this study is within the digital culture and is close to the study of micro-celebrities and self-branding developed by

Senft (2013) or Marwick (2013), linked to anonymous users who gained visibility by publishing content on blogs, or on YouTube, for example. In this sense, the characterization of the influencer involves: 1) applying positive self-branding strategies, 2) managing his or her visibility in digital media 3) cultivating the community of followers so that they consume the content in an aspirational way (Leaver et al., 2020, p. 106). According to Ardèvol and Márquez (2017, p. 75) the success of these media figures is based on their direct, intimate and sincere communicative style with their audience.

In this research, the term *eco-influencers* on Instagram is used in reference to profiles committed to the dissemination of environmental-related content. These users, who are not necessarily involved in traditional activism and organized collectives, promote a sustainable lifestyle through their own example. Consequently, this becomes the main objective and theme of their communications.

It could be said that the figure of the *eco-influencer* responds to environmental activism promoting sustainable change by incorporating it into their own lives. In this sense, they present similarities with other influencers, for example, those who promote healthy eating habits (Marauri et al., 2021).

However, they differ from social movements activism in several aspects. The most notable is that their proposals are framed in a general way in individual action and not so much in collective action, since they do not present a collective articulation a priori (although they may

adhere to campaigns like #futuristicfebruary[1] or #Fridaysforfuture[2]). Another noteworthy aspect is its close relationship with consumption and with sustainable brands. They are contributing together for an emerging eco and sustainable market.

2.2. CONSUMPTION, LIFESTYLE AND ACTIVISM

According to Featherstone (1987, p. 59) "the new of heroes culture consumer make lifestyle a life project and display their of in individuality and of style the sense particularity the of assemblage goods, clothes, practices, experiences, appearance bodily and dispositions they design together into a lifestyle". So, if we understand the practices of clothing, hygiene, savings, diet, cleaning beaches, etc. promoted by eco-influencers as a way for searching for a sustainable lifestyle, the action of many people following them could have a global impact on the generation of new consumption patterns, or in some cases, even non-consumption. This activism seeks a change in consumer habits from a direct small actions in the day to day and in the domestic space. In this way, the concern for a proper and authentic lifestyle that promotes the culture of consumption is hybridized, at least in this case study, with the proposal of a broader social change based in collective aspirations.

Eco-influencer environmental activism would therefore be situated at an individual level, in the sense that it generates confidence that our individual actions can lead to a real, effective and long-term change also in productive structures, if they are many and coordinated.

It could be argued that social media and the notion of the influencer open new modes of activism based on promoting a certain lifestyle. Eco-influencers seek to create an audience that shares their aspirations, and in this way, the construction of a lifestyle is linked not only to a new fashion or personal taste, but to a collective aspiration to promote a sustainable lifestyle based on shared values and common practices. This point would differentiate it from other 'fashions' or youth styles to which the market has adapted without producing a correlative change in the productive structures, or in the forms of social or political organization.

For this reason, Haenfler et al. (2012) contend that the separation between lifestyles and social movements has left a blind spot, located at the intersection between private individual action and activism, personal and social change, personal and collective identity. They suggest the concept of social movements around the lifestyle (Lifestyle Movements) as capable of actively promoting new values and cultural meanings, challenging the hegemonic culture and fostering a broader social change. This new activism is based on three characteristics: a) lifestyle choices as a tactic for social change; b) the centrality of personal identity as the engine of change; and c) a diffuse organizational structure (Haenfler et al., 2012, p. 2).

In contrast to consumer mobilizations, for example through boycotts of certain brands, the change in lifestyle is seen as something permanent that has a longer-term effect (Holzer, 2006). It could be argued, according to Schlosberg and Coles (2016), that the sustainable and ecological lifestyle, green consumption, and anti-consumption practices (Black & Cherrier,

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1 It is a challenge powered by the Instagram account @sustainable_duo. It consists of saving all plastic and non-biodegradable waste that we generate during the month of February and publishing a photo with them. Accumulating them and living with them makes us aware of the amount of garbage we create and the impact it has on the planet.

2 Movement led by young people who every Friday protested together against global warming.

2010, p. 439) that are disseminated through of social networks, can be considered as a type of social movement by promoting flows of alternative actions.

2.3. AESTHETICS AND VISUAL ACTIVISM IN INSTAGRAM

Several authors have theorized the close relationship between consumption, design and aesthetics in contemporary society. Lipovetsky and Serroy (2015) highlight the importance of design and photography, promoted in part by social networks, as a vehicle for transmitting visual styles and acquiring aesthetic skills. This issue is clearly visible on Instagram, considered by most users as the platform where content is the most important issue. However, Instagram goes beyond this question. The *Studying Instagram beyond selfies*[3] (2018) conference discussed the evolution of research on Instagram, pointing precisely towards its politicization or its use in the field of activism. The question that arises then is: Can a network based on aesthetics be a vehicle for social change?

The political use of social media has been extensively studied in recent years (Postill, 2018; Treré, 2018), especially focused on Twitter. However, the role of images in activism and social movements has not been so extensively studied, perhaps because they are generally limited to the local context (Doerr & Teune, 2012). In any case, the most specific concept of visual activism is usually referred to artistic or creative groups, who put their visual and performative skills at the service of a cause. For Demos (2016) the concept offers a provocative proposal, but at the same time admits that visual activism could be methodologically

weakening its political purpose, as it is aimed at aesthetic enjoyment, spectacularized, sold and consumed by those politically opposed. In this way, it is understood that visual activism, as aesthetic, would lose force.

However, environmental activists on Instagram propose personal narratives where the role of images is fundamental. Therefore, the relationship between Instagram aesthetics (Leaver et al., 2020) and visual activism should be explored.

3. OBJECTIVES AND METHODOLOGY

The objective of this research is to explore the relationship between personal narratives, lifestyle and environmental activism on Instagram.

This objective is structured in the following points. Firstly, it is intended to verify the existence of the emerging figure of environmental influencers. Secondly, it seeks to understand and characterize the activism that they pose in relation to the concepts of lifestyle and consumption. Finally, the aim is to delve into the role that images play and their relationship with visual activism.

For this, the methodological approach used is a remix (Markham, 2013) of qualitative orientation methods that combines participant observation online with in-depth interview and narrative analysis. We start from the duality of the Internet as a method and field of study (Hine, 2005). The Internet is not only a research tool for collecting data, but it is also the empirical field where research is carried out; Social networks are means of publication, but they also constitute the social context where people meet and interact (Ardèvol & Gómez-Cruz, 2012). In this way, the field work has consisted of the creation of a research profile on Instagram and the

3https://londonenglish.live/2018/03/23/studying-instagram-beyond-selfies-instagram-conference-2018-01-june-2018-middlesex-university/

continuous monitoring, from June 2020 to June 2021, of different profiles to constitute our field of study and that has allowed us to carry out 13 in-depth interviews via telematics[4].

The theoretical sample includes 60 Instagram accounts whose objective is the dissemination of environmental content. It is a theoretical sample (Strauss & Corbin, 1994) as it seeks to maximize the differences, variety of content and approaches. It was generated through the 'snowball' system in which some users lead the following, because they follow each other or share the same hashtags in their publications. It was also influenced by Instagram's automated algorithmic system that detects like-minded users and generates recommendations. In this sense, it is considered that this sample has reached saturation, because, even if the number of profiles has been expanded -in order to find new particularities- a substantive change -that forces to change the characterization of the initial sample- has not been detected. It is not to obtain statistically representative data, but a significant typology in terms of characterization of the studied universe.

3.1. DESCRIPTION AND CHARACTERIZATION OF THE PROFILES

The criteria for the sample were: a) maximum variability of narrative profiles and styles that have sustainability, the environment and climate change as their theme; b) language: given that the universe of the sample is global and local, profiles are included in both English (30) and Spanish (25), extending it to other langua-

ges such as Catalan and German (5); c) amount of followers.

In relation to this last criterion, it is important to note that according to the classification of the typologies of influencers by volume of followers, the bulk of the accounts studied in this research is between the range of micro influencers (10,000-100,000) and mid-tier influencers (100,000-500,000), which are quite even (21 and 22 accounts respectively). Some examples of accounts in the mid-tier range are @carlotabruna or @the.eco.warrior. In the macro-influencer range (500,000-2,000,000) there are 7 accounts, such as @nancy_risol or @thezerowasteguide and in the All-Star 5 there were accounts like @kristenanniebell and @kortajarenajon who combine activism and other types of content. In addition, a fifth category has been added, called nano-influencers, which includes 5 accounts in other languages that have less than 10,000 followers.

Figure 1

Accounts by number of followers

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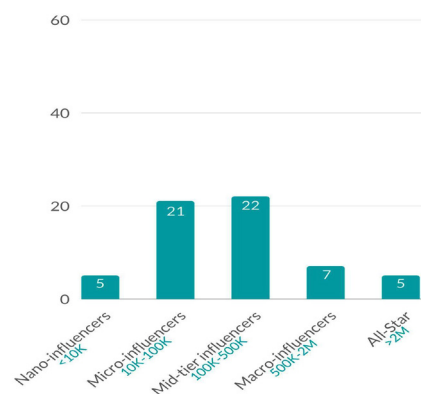
4 Listed at the end of the article in the bibliography. In this article we focus on the first of them, although in subsequent articles we address other aspects that emerge from our field work (see Ardèvol et al. 2021).

It is worth noting that in the set of profiles selected there is a considerable female presence. Of a total of 60 accounts, 22 are visibly managed by women, and only 7 are identified with male users. The rest of the accounts present diverse ownership or leadership, including anonymous, collective or corporate profiles.
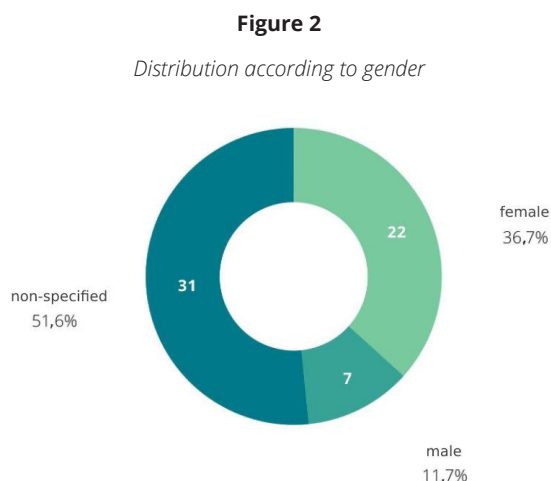
Figure 2

Distribution according to gender

This bias is due, partly, to the method used to elaborate the sample (the recommendation algorithm, in addition to suggesting similar topics, may also suggest users with similar characteristics). However, this pre-eminence of female users coincides with other studies (Filgueiras, 2019; Murphy, 2019; Shabir, 2020) dedicated to the emergence of environmental activism on Instagram. Furthermore, in Shabir's study, 94% of the followers of these accounts are also women (Shabir, 2020, p. 25). This percentage also coincides, as evidenced in the in-depth interview, with 90% of followers of the @vivirsinplastico community, or 75% of followers of @publiclandhatesyou (another of the studied cases).

Participant observation and in-depth interviews show, on the one hand, a connection between this type of activism and eco-feminism in a certain way On the other hand, it points to women empowerment in this type of environmental struggle from everyday life, consumption and domestic space. It is also important to highlight the accounts promoted by couples and families (of two or more people), 6 in total, for example @nubiaehijos, @petitapetjada or @sustainableduo. They have decided to undertake a process of change in their domestic life to eliminate plastic at home, consume sustainable and local products, etc. and they have decided to share their experience by creating an account on Instagram and other social media, and even much earlier or in parallel, opening a blog where they can expand their narratives. This data is relevant and perhaps is indicative of a trend within this form of activism.

The rest of the accounts do not present a personal or family identity, but rather belong to groups of friends or organizations such as @greenpeace and accounts dedicated, to a greater or lesser extent, to the sale of organic products. This was the case of @esturirafi, led by two sisters who set up their company by selecting and testing the products for sale themselves based on their environmental and aesthetic criteria.

This kind of profiles also promote a lifestyle in line with the activists they follow and interact with.

Unlike the three categories that Shabir (2020) finds in her study: 1) shops or stores, 2) influencers and lifestyle bloggers, 3) tips and tricks for a more sustainable life; we observe that these categories hybridize between the different profiles in our sample, and it is difficult to establish clear boundaries between them. However, when adapting this classification to our sample, we found: 1) lifestyle activists and bloggers, which in turn, can be personal, partner or family accounts dedicated exclusively to the environment and sustainable consumption; 2) influencers and lifestyle bloggers who also pro-

mote eco products; 3) tips, tricks and memes; generally managed individually or collectively and are usually anonymous; 4) shops or small producers; 5) collectives and organizations, more focused on raising awareness and collective mobilization about the environment. In this study, the first three categories are considered eco-influencers, although as a whole they would form part of an "eco-sphere" in which environmental activism, ecological market and consumption, and proposals for a sustainable and healthy lifestyle are hybridized.

4. @VIVIRSINPLASTICO CASE STUDY

4.1. CASE DESCRIPTION

From this first overview we decided to deepen in a smaller number of accounts. This article analyzes the account @vivirsinplastico, promoted by a couple who introduce themselves as Patri and Fer, and who explain their own experience since they decided to eliminate plastic consumption (5 years ago), sharing advice about it with their community of followers (67,600 at the time of writing).

For this case study, the contents (narratives and images) published in this account were analyzed as a whole (576 posts as of 11/26/2020), especially the posts published in the last 2 months (7 posts as of 11/26/2020). On the other hand, an in-depth interview was conducted with the promoters of the project, asking them about the following aspects: a) the origin and motivation of the project, b) their perceptions about the concept of influencer and its relationship with activism and consumption, c) their creative process, d) their relationship with their audience, and e) their expectations with the project.

For the analysis of personal narratives on Instagram, the concept of 'small stories' (Georgakopoulou, 2016) is used, based on an analysis of the different semiotic forms (including images and collaborative narratives) of the publications of the selected profile.

4.2 ANALYSIS AND RESULTS

4.2.1 PERSONAL NARRATIVE AND IMAGES

As mentioned, Patri and Fer are a couple (in their forties) who decided to make a change in their lifestyle by reducing the consumption of plastics. Simultaneously, they began to write a blog relating their experience. A few months later they did it using Instagram. Currently, their ecosystem in social networks also includes Facebook, Twitter, LinkedIn and YouTube. The digital space with the most followers is Instagram, which has somewhat modified their creative process: before they thought of the blog first, but now they tend to think of content for Instagram first, although they often take advantage of it, expand it and, in that way, it also has a place in the blog.

It is interesting to note how the fact of sharing their process of change to a life without plastic with an imagined audience meant for them a way of motivating themselves to continue with their purpose, making a public commitment as well as getting their message spread. In this sense, their first post on Instagram is a photograph of their garbage accompanied by the text: "This is the garbage that we generated in week 0 of our #Vivirsinplastico challenge to recognize the plastics that we consume daily". During the first month of their change of life, we observe that each post reflects the amount of plastic consumed, at the same time that they receive comments encouraging them to continue with the challenge.

Figure 3

First post by @vivirsinplastico on 08/21/2015

Source: @vivirsinplastico
https://www.instagram.com/p/6pz7gTRYM9/

To this day, they publish posts of various kinds: garbage that they collect on beaches, news from the media, surveys, readings, motivational messages, recycling tricks, sustainable living practices, etc.

The story about a sudden change in their life is a narrative constant also reproduced in other profiles (@margreen, @laurainwaterland or @sustainableduo). There is a revealing moment (a visit to a beach, a family trip) that awakes them //of the need to contribute to sustainability and share this desire for change on social media. Therefore, this and other eco-influencers publish a post from time to time remembering the origin of their account and their motivation to the newbies / the new audiences.

Regarding the images on Instagram, @vivirsinplastico elaborate their publications with a remarkable aesthetic criterion, which denotes sensitivity and skills of photography and image (in the interview the training of both in this area was confirmed). The following types of published images are identified: fruit and vegetable still lives, images of events, promotion of their book, details of objects, complaint photos (for example, fruits wrapped in plastic), infographics, alternative products and compositions based on garbage collected. Although there is

no specific formal criterion in the grid, an intention is detected to display their information in a visually attractive way. For example, using a zenith point of view to highlight the geometry and symmetry in the food or in the shapes made from the waste collected on the beach.

Figure 4

Composition of fruits and vegetables

Source: @vivirsinplastico
https://www.instagram.com/p/BQw-f8kgOWp/

Figure 5

Composition made with waste found on the beach.

Source: @vivirsinplastico
https://www.instagram.com/p/91KFFoRYFu/

Instagram has been taking more prominence over time in its publication activity since they say that many times the audience they are targeting does not reach the blog. Of all the published content, they told us that their community prefers personal issues, anecdotes or their own experiences. That is when they receive the most likes, comments or other types of interactions. For example, in this post of August 2, 2020, they published a personal photo and the following comment:

Source: @vivirsinplastico
https://www.instagram.com/p/CDZKW8FqPWx/

In this text, the interaction with their community is grasped, they collect their opinions and promote sending feedback that receives 813 likes and 34 responses. We highlight one of them:

> The most difficult thing is finding where to buy in bulk depending on where you are. And the sites where they continue to insist that they have to put a bag for you ... Thank you for all the super useful information you give and for being a reference!!

This imbrication of the personal narrative in the purpose of its disseminating the problem with plastics, allows us to understand this type of practices from the concept of small stories that develop discontinuously in the feed of @vivirsinplastico, in the comments received and in the conversations developed through direct messages, "a lot of people write us privately" (@vivirsinplastico, interview 2020). The personal narrative, linked to the lifestyle proposed by Patri and Fer would fit in the characteristics of a small narrative (Georgakopoulou, 2016) supported by a set of images that capture attention and that are developed in a 'friendly' way in the Instagram context. Following this author, they are not stories that have a beginning, middle and end, but small personal stories that narrate a situation and a context and invite interaction through continuing with other stories that complete it.

4.2.2 RHETORIC OF CHANGE, ACTIVISM AND INFLUENCE

From the observation of the profile @vivirsinplastico it can be inferred that its message aims to contribute to social change from personal, small domestic actions, such as a change in habits in daily consumption. For this to happen, it is perceived as necessary to repeatedly educate their public and communicate their ideas, as stated in the interview, distinguishing between new followers *'who have basic knowledge needs'* and advanced ones *'who have been following them for a long time'* (this aspect also appears in other interviewees such as @publiclandhatesyou or @zeroxplastic).

Regarding the notion of activism and the emergence of these profiles on Instagram, it should be noted that they do perceive themselves as activists. It would not be a traditional activism linked to social movements and political protest, but an alternative one, based on the everyday. This type of day-to-day activism of small gestures would fit perfectly with the activism of Lifestyle Movements (Haenfler et al., 2012).

Thus, the activity of @vivirsinplastico takes place mainly online, although they are having more and more impact and carry out more offline activities.

After seeing how they influenced their followers, last year they decided to dedicate themselves exclusively to their task of raising awareness and information, so they created a non-profit association, while also opening a patronage account on Patreon.

Patri and Fer consider themselves more activists than influencers or communicators, although they recognize that they have contributed to the change in the mental framework of many people who follow them. In this sense, they distance themselves from the more conventional influencer notions associated with the marketing world and highlight their aspiration to create a more powerful movement in awareness, beyond likes: "We do not want to be slaves of the algorithm" (@vivirsinplastico, interview 2020). This question is fundamental when it comes to conceptualizing this emerging phenomenon, this figure of influence in the Internet. Other cases studied also present an ambivalent relationship with the notion of influencer (although deep down they all recognize their positive influence on their community) and offer nuances regarding their vision of activism.

4.2.3 CONSUMPTION AS A CHANGE OF LIFE

The proposal of @Vivirsinplastico is based on reducing consumption, buying only what they really need. Within this approach, they propose that what they buy is as sustainable as possible, avoiding plastics, promoting reusable packaging and bags, betting on farmers markets, and in general, alternative products to other more polluting.

Their case differs from other profiles in our sample who openly promote or directly sell products of an ecological nature. Although they have received proposals to commercially promoteproducts, they tend to stay quite apart from this type of activity since one of their maxims is to avoid unnecessary consumption. In five years, they have only said "yes" to two brands because they fit very clearly with their objectives. One of these commercial products or services is Storytel, which offers a version of the book they have published. The other is the Son Estrella Galicia Posidonia Festival, which dedicated part of the profits to the conservation of Posidonia.

During the project, they demonstrate that they know their audience very well and estimate that

the majority are women between 20-40 years of age. They claim that they do not like to "annoy" their followers with strategies such as "tag x people", ask questions for them to answer, giveaways, etc. Therefore, they prefer the community to function organically, without making any kind of call to action or intervening in it, although they do question their community regularly, seeking complicity to share problems and solutions.

5. CONCLUSIONS. *ECO-INFLUENCERS*: BETWEEN ACTIVISM AND THE MARKET

In the process of carrying out this research, different types of profiles that are dedicated to the dissemination of content on sustainability have been analyzed: from promoting the purchase of *'eco'* products to indigenous profiles, stores and commercial profiles, associations, etc. All of them with connections and elements in common, and their link with an emergent market is one of them, a fact that has produced a certain difficulty in clearly categorizing them as "activists". This mix of digital activism could define the figure of "eco-influencer".

A high female presence has also been observed in this sector and a type of profile promoted by families and couples, such as the proposed case study, which distances itself from the idea of the individual influencer and which could have a certain path in this context. Taking into account the bias that the algorithm may have produced when suggesting certain accounts to become part of our sample, we see that the analyzed set is part of what we have called an "eco-sphere", since the accounts relate to and follow each other, and in some cases, collaborations common between them.

From the analysis of the accounts' sample and the case study, it can be inferred the emergence of a new phenomenon, that can be conceptualized at the intersection of personal narrative with environmental activism. This environmental activism is articulated through the idea of personal lifestyle as a possibility to exercise a domestic activism, from small daily actions and modulating our consumption capacity, so many individual actions may produce a social change in consumption habits that may lead to a social and political changes.

Regarding the eco-influencers' narratives, we can avouch that a good part of the accounts studied propose a 'green' lifestyle through a cared aesthetics as a form of fostering social change (Autio et al., 2009), presenting a solution to climate change in positive terms in order to seduce the maximum number of people. But still, can we talk about activism? Or can activism be compatible with the dynamics of the Instagram market and influencers?

According to the observation of the accounts and the interviews carried out, it can be affirmed that it is activism but with its own characteristics. This affirmation fits well with the definition given by Haenfler et al. (2012) for the Lifestyle Movements. It is an activism linked to personal life choices, which promotes a concrete lifestyle based on sustainability. This lifestyle is interwoven with an emerging market to provide the movement with the products it needs to carry out its aspiration of a "Good life", which contributes to alleviating climate change.

In this sense, it is important to continue observing the fusion between the notions of activism and influencers, taking into account the non-trivialization of lifestyle concepts in the capacity for mobilization and activation of social changes. In some way, the lifestyle articulated

by personal narratives acts as a mobilizer for change.

In fact, there is no consensus on the naming of this phenomenon, since in a more generalized way the idea of the **eco-influencer** is very new and is still associated with more conventional celebrities, such as Leonardo di Caprio or even Greta Thunberg. In this text it is proposed to expand the term eco-influencer to these environmental activists capable of attracting a large number of followers and who focus their activity on promoting changes in our lifestyle and our domestic practices with a philosophy based on individual "small changes" to achieve great collective changes, which challenges the most classic conception of a social movement linked to a political ideology.

As for visual activism, it can be said that most of the accounts studied have a neat image and their own aesthetic. In the case of @vivirsinplastico we observed that there was an appreciation for the images made with some care. They think that a careful aesthetic contributes to the diffusion of their fight in favor of the environment. This idea conflicts with certain conceptions of visual activism, as something based on the banality or superficiality of the images and that would make the 'cause' less effective. In this sense, the examples studied in this research would fit with the Instagram culture in its forms of presenting content in an aesthetic way to articulate a lifestyle proposal. This approach would be more in line with other authors who point to the transformative capacity of aesthetics (Calvera, 2007; Lipovetsky & Serroy, 2015). Therefore, this combination of aesthetics, activism and daily life can have a path and perhaps may cause social changes in a direct and sustained way. Beyond conventional media and social movements based on collective action in public space, eco-influencers propose, through careful aesthetics, to understand political action as a practical and beautiful intervention on the world. We will be aware of its evolution.

Digital competences and media literacy for an open and online education

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ANNEX 1: ANALYZED ACCOUNTS

@carlotabruna	@gerardo-delvillar	@trashisfor-tossers	@leonardodi-caprio	@luisaneu-bauer	@gretathunberg
@vivirsinplas-tico	@sustaina-ble_duo	@margreen_s	@laurainwa-terland	@greentipsca-riuma	@the_plastic_free_people
@marianama-tija	@petitapet-jada	@kortajare-najon	@Happy_Pla-net_Lifestyle	@ecogodess	@nubiaehijos
@goodkarma-mart	@julicarva-jal33	@nancy_rysol	@ecoquotes	@zerowastes-toreecuador	@zerowastes-tore
@verdealalma	@publi-clandshate-you	@fridaysforfu-ture.de	@reducewas-tenow	@about_envi-ronment	@kristenannie-bell
@get.waste.ed	@futureearth	@elcambiolo-gico	@planteaen-verde	@ilovecyclo	@ecologistas
@easyeco-tips_es	@unpac-kedshop	@ceroresiduo	@esturirafi	@usaryreusar	@sinplastico
@ecoinventos	@mindbody-green	@zerowaste-home	@chicksforcli-mate	@zeroxplastic	@goingzerowas-te
@unep	@the.eco.warrior	@greenpeace	@thezerowas-teguide	@wastefree-planet	@amenityofna-ture
@noe_ona	@honeycom_living	@mujer.se-milla	@package-freeshop	@planet_pre-server	@need.eco.friendly

ANNEX 2: INTERVIEWS CONDUCTED (IN CHRONOLOGICAL ORDER)

1	@vivirsinplastico	24/11/2020
2	@laurainwaterland	22/12/2020
3	@public_lands_hateyou	28/12/2020
4	@reducewastenow	04/01/2021
5	@easyEcoTips	15/01/2021
6	@petita_petjada	20/01/2021
7	@marianamatija	01/03/2021
8	@usaryreusar	07/04/2021
9	@esturirafi	13/04/2021
10	@unpackedshop	19/04/2021
11	@planet_preserver	20/04/2021
12	@noe_ona	28/04/2021
13	@ilovecyclo	11/05/2021

The role of narrative persuasion in Edu-Entertainment to improve health in Latin America: Review of the last five years

El rol de la persuasión narrativa en el Edu-Entretenimiento para mejorar la salud en América Latina: Revisión de los últimos cinco años

O papel da persuasão narrativa na Edu- Entretenimento para melhorar a saúde na América Latina: revisão dos últimos cinco anos

8

ARTICLE

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Abstract

An integrative review of the literature of the last 5 years on narrative persuasion research in health communication in Latin America was carried out. The search was carried out in the WOS and Scopus databases. 87 documents were identified, of which, 6 met the selection criteria. The results indicate that there is much to be investigated in Latin America on how narratives can influence preventive and risk behaviors in health. This would demonstrate how powerful these strategies are in generating attitudinal and behavioral changes and help those who take decisions in the health area to create public policies based on empirical evidence, according to the social and cultural realities of each population.

KEY WORDS

Edu-Entertainment, Health communication, Latin America, Narrative persuasion.

Resumen:

Se realizó una revisión integradora de la literatura de los últimos 5 años sobre las investigaciones en persuasión narrativa en comunicación para la salud en América Latina, la búsqueda se efectuó en las bases de datos WOS y Scopus. Se identificaron 87 documentos, de los cuales 6 cumplieron los criterios de selección. Los resultados indican que falta mucho por investigar en América Latina sobre cómo las narraciones pueden influir en conductas preventivas y comportamientos de riesgo en salud, esto ayudaría a demostrar lo poderosas que son estas estrategias en la generación de cambios actitudinales y conductuales, ayudando a quienes toman las decisiones en el área de salud para crear políticas públicas basadas en evidencias empíricas acordes a las realidades sociales y culturales de cada población.

PALABRAS CLAVE:

Edu-Entretenimiento, Comunicación para la salud, América Latina, Persuasión narrativa.

Resumo

Realizou-se uma revisão integrativa da literatura dos últimos 5 anos sobre as pesquisas em persuasão narrativa em comunicação para a saúde na América Latina, a busca foi realizada nas bases de dados WOS e Scopus. Foram identificados 87 documentos, dos quais 6 cumpriram os critérios de seleção. Os resultados indicam que ainda há muito a ser investigado na América Latina sobre como as narrativas podem influenciar comportamentos preventivos e de risco em saúde, o que ajudaria a demonstrar o quão poderosas essas estraté-

gias são na geração de mudanças atitudinais e comportamentais, auxiliando quem toma decisões na área da saúde para criar políticas públicas baseadas em evidências empíricas de acordo com a realidade social e cultural de cada população.

Palavras-chave

Edu-Entretenimento, Comunicação para a saúde, América Latina, Persuasão narrativa.

1. INTRODUCTION

The demographic, socioeconomic and health situation for the Americas region, according to the latest report from the Pan American Health Organization [PAHO] and the World Health Organization [WHO] (2019), has important variations for each subregion where Latin America and the Caribbean are at a general disadvantage compared to North America. For example, the adolescent fertility rate in Latin America and the Caribbean is 61.9 births per 1,000 women between the ages of 15 and 19, considerably higher compared to the 17.6 of North America. A similar situation occurs with maternal mortality (69.5 vs. 6 deaths per 100,000 births) and mortality per 100,000 inhabitants from communicable diseases (80.4 vs. 27.5), non-communicable diseases (453.7 vs. 404.9), ischemic disease heart disease (87.9 vs. 75.8), cerebrovascular diseases (43.8 vs. 21.7) and diabetes mellitus (43.2 vs. 14.6).

There are other health parameters that, although they occur in a higher proportion in the North American region, constitute a challenge for Latin America and the Caribbean given their consistent progression in recent years and the implications on the development of other chronic conditions of high cost to people and health systems (PAHO-WHO, 2019). Among these are obesity and overweight, which affect 59% of the population. Other important indices to ensure the health and quality of life of the population in the region are the unmet need for family planning (9%) and prenatal care without trained personnel (14.9%) (PAHO-WHO, 2019).

It is a challenge for the region to address the risks of each segment of the population. For this reason, epidemiological problems continue to be tackled through the implementation of health communication interventions and programs, adapted to each context and with the participation of multiple sectors and society.

Cuervo and Bermúdez (2018) mention the importance of health research, since it is essential to determine the effects of interventions, identify problems, balance costs, and make sensible and well-informed decisions. They consider that health research in the last decade in Latin America has shown great advances, reflected in the increase in the number of countries that have defined and updated their national agendas and health research policies.

On the other hand, Cuesta and Menéndez (2017) point out two aspects of why social communication should be included in public health. The first aspect refers to the "transmission of information that allows citizens to know options for healthy behavior or risk and the second aspect refers to the creation of healthy habits through the implementation of health education programs" (p.61).

Therefore, one of the main objectives of communication in public health is to design effective messages that can persuade the target audience to change attitudes or risk behaviors (Shen et al., 2015).

Within these efforts, the classic health communication campaigns based on the use of short advertisements in mass media have been openly criticized because their effectiveness is limited, and they are not helping to reduce risk behaviors. At the same time, the Education-Entertainment or Edu-Entertainment (hereinafter EE) approach has strongly emerged to face various social and health challenges (Moyer-Gusé, 2008). This format seeks to provoke pro-social changes through the emission of entertainment messages that contain educational messages in a subtle way. This type of strategy is based on the formats of television series, soap operas and others that have a cast of characters whose behaviors and attitudes can serve as a model for viewers.

Storytelling is increasingly used in health communication to achieve public health goals. Research has shown that storytelling can serve as effective health interventions. Compared to other types of messages, storytelling can create story-consistent beliefs and attitudes, increase behavioral intentions, and encourage healthy behaviors (e.g., Dillard et al., 2010; Falzon et al., 2015). In recent years, various theories of EE have converged to identify characteristics such as identification with characters and narrative transport, central elements of persuasive results.

Based on the research carried out in this field, it has been possible to demonstrate, first, how the role of narrative transport can have far-reaching consequences for people's opinions, knowledge, intentions and actions. The various models on narrative persuasion processes (Green and Brock, 2002; Moyer-Gusé, 2008; Slater and Rouner, 2002) also agreed on how narrative transport can explain the per-suasive effect of a narrative. One explanation is that the audience identifies with a character and as a result becomes more susceptible to that character's beliefs and goals.

In this way, research on narrative persuasion studies the processes or mechanisms that explain how narrative messages can change the attitudes, beliefs, intentions and behaviors of people (Hoeken and Fikkers, 2014; de Graaf et al., 2012; Green & Brock, 2000; Igartua, 2010). In fact, meta-analysis reviews have found that narratives cause significant effects on these processes (Braddock & Dillard, 2016; Shen et al., 2015). This knowledge is applied in health communication (de Graaf et al., 2016), one of the most outstanding developments being the design of EE interventions (e.g., Igartua and Vega, 2016; Moyer-Gusé et al., 2011; Murphy et al., 2013; Robinson and Knobloch-Westerwick, 2017).

Petty and Cacioppo (1986) define persuasion as any change that occurs in people's attitudes as a result of exposure to a type of communication. For his part, Igartua (2007) considers that persuasive communication is the deliberate use of communication to create, modify or reinforce the attitudes or opinions of people regarding a particular issue.

The theories developed in the field of EE and narrative persuasion affirm that there are variables called "persuasive mediators", whose function is to mediate the persuasion process, conditioning the effects of the independent variable (the persuasive message) on the dependent variable (the persuasive message, change of intention, attitude or behavior). It is suggested that mediators of narrative persuasion may include identification with the character and na-

rrative transport (de Graaf et al., 2016; Igartua and Vega, 2016; Igartua et al., 2019; Kim and Lee, 2018). In general, these investigations suggest that involvement with the narrated story and with the characters play a relevant role in the persuasive impact of EE messages (Moyer-Gusé, 2008; Robinson and Knobloch-Westerwick, 2017; Van Laer et al., 2014).

Based on the above considerations, the need to carry out an integrative review of the literature of the last 5 years on the study of narrative persuasion applied in Latin America in the context of narratives in communication for health is based, in order to identify the health problems addressed, the format used, the target audience, the methodology used and the common results. It is intended to be carried out in such a way that it allows making a series of recommendations on the implementation and evaluation of this type of narrative strategies in the region.

2. METHODOLOGY

The recommendations of Souza et al. (2010) were used for the integrative literature review. The following databases were used: Scopus and Web of Science (WOS) for being the ones with the greatest international scope. The following search terms were used: *"Communication and Health"* + *"Narrative Persuasion"*; *"Health Communication"* + *"Narrative Persuasion".*

Initially, 67 articles were found in WOS and 54 in Scopus, some of them were repeated in both databases, therefore, the total list was reduced to 87 articles. Then, two reading filters were applied to perform the information analysis. The first filter refers to the preliminary reading of the title and abstract, and the second to the review of the methodology and results, since some studies that were not done in Latin America did study the Latin American population. This information is presented in greater detail in the methodology.

To be included in this review, the documents had to meet the following criteria: a) have been published between 2016 and 2020, b) present empirical findings of studies of narrative persuasion applied in Latin America; and c) present findings on the impact of Edu-Entertainment strategies, including variables such as knowledge, attitudes, intention, perceptions and behaviors regarding a health issue. According to these criteria, 81 documents were excluded.

The final set consisted of 6 articles in English. These were read in their entirety and selected for review. For this, a bibliographic review card was prepared which included the following variables: article title, name of the journal and database, authors and year of publication, country where the study was conducted, medium and message, research design and results. (See Table 1). Finally, a detailed analysis of the information was carried out in order to synthesize it.

Table 1

File of reviewed articles

Title / journal and database	Author(s) / year	Country where the study was conducted	Sample / target audience	Format	Message	Research design	Results
Narrative formats for teenage pregnancy prevention. The effect of the narrative modality on preventive attitudes. Revista Latina de Comunicación. WOS y Scopus.	González-Cabrera, Catalina & Igartua, Juan-José (2018).	Ecuador	220 female adolescents (15 to 19 years old).	Video	Prevention of unintentional adolescent pregnancy.	Experimental. Pre-test and post-test questionnaire. The video format "What we don't think" (testimonial vs. dialogic) was used, the narrative voice of the message was used in the first person, with the protagonists looking directly at the camera.	It was found that the level of media literacy moderated the indirect effects of the testimonial narrative video on the perception of the risk of experiencing negative situations in an adolescent pregnancy.
Entertainment-Education Narrative Versus Nonnarrative Interventions to Educate and Motivate Latinas to Engage in Mammography Screening. Health Education & Behavior. WOS.	Borrayo, Evelinn; Rosales, Monica & González, Patricia (2017).	United States	141 Latina women (40 to 81 years old).	Video and printed material.	Promotion of the use of mammography for the early detection of cancer.	Experimental. Pre-test and post-test measurements. The women were randomly assigned to one of three groups: 1) Watch the video "Where's Maria?", 2) Watch the educational video "Quality Mammography Can Save Your Life", 3) Receive and discuss 3 brochures from the National Cancer Institute and the American Cancer Society with a facilitator.	The three formats used improved the knowledge, self-efficacy and behavioral norms of the women in the study. However, the narrative video produced significantly higher effects than the other two formats.
Identification with Characters, Elaboration, and Counterarguing in Entertainment-Education Interventions Through Audiovisual Fiction Journal of Health Communication. WOS y Scopus. American Journal of Public Health. WOS.	Igartua, Juan-José & Vega, Jair (2016).	Colombia	208 young men and women from Colombia (14 to 20 years old).	Television series (audiovisual fiction).	Education on sexual relationships, gender violence and sexual diversity.	Experimental. Participants were randomly assigned to watch one of three episodes of the series "Revelados, desde todas las posiciones" on the following topics: 1) Adolescent sexuality, 2) Gender violence, 3) Sexual diversity.	Identification with the characters led to greater cognitive elaboration and this, in turn, to more favorable attitudes towards the behaviors promoted by each of the episodes.

Title / journal and database	Author(s) / year	Country where the study was conducted	Sample / target audience	Format	Message	Research design	Results
How in-film product placement stimulates fast food consumption in developing countries. Interciencia. Scopus.	Redondo, Iganacio & Bernal, Jorge (2020).	Chile	812 men and women from Tarapacá, Chile (from 18 to over 41 years old).	Movie	Nutrition education for consumers in developing countries to understand and resist the promotion of unhealthy fast food embedded in movies.	Experimental. Two study groups were randomly assigned to view the two experimental treatments. One with the scenes where McDonald's products are consumed in the movie The Good Lie, and the other where those scenes are not (control group).	The visualization of content related to McDonald's embedded in the film produced an increase in the choice of its products, this occurred because the participants identified with the characters and were transported by the story.
Who cares what others think? The role of Latinas' acculturation in the processing of HPV vaccination narrative messages Journal of Health Communication. WOS y Scopus.	Walter, Nathan; Murphy, Sheila; Franz, Lauren &, Baezconde-Garbanati, Lourdes (2017).	United States	186 Mexican American women (27 to 47 years old).	Video	Promotion of the HPV vaccine.	Experimental, Two conditions ("Tamale Lesson" narrative vs. non-narrative).	The level of acculturation moderated the processing of the message. Consistent effects were found for less acculturated women in descriptive and cautionary norms regarding HPV vaccine adoption. The format of the message (narrative vs. non-narrative) did not have a direct effect on vaccination standards and behavioral intent.
East Los High: Transmedia Edutainment to Promote the Sexual and Reproductive Health of Young Latina/o Americans American Journal of Public Health. WOS.	Wang, Hua & Singhal, Arvind (2016).	United States	In the survey: 100 young Latinas (between 12 and 23 years old) and 110 people related to young pregnant Latinas. In the experiment: 136 young Latinas (between 18 and 28 years old).	Television series	Promotion of sexual and reproductive health	Multi-method and multi-stage study to analyze the first season of the series "East Los High": 1) Follow-up of the online analysis (2013-2014), 2) Online viewer survey (2013) and 3) Laboratory experiment (El Paso, TX, 2014).	East Los High reached a wide audience, generated strong audience engagement, and had a positive cognitive, emotional, and social impact on sexual and reproductive health education and communication.

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The results present a brief summary of the selected investigations that have been carried out in Latin America or with a Latin American population. The research design, the study population, the communication strategy and the analyzed variables are detailed, along with how the results can be of social implication.

3. RESULTS

3.1. IDENTIFICATION WITH CHARACTERS, ELABORATION, AND COUNTERARGUING IN ENTERTAINMENT-EDUCATION INTERVENTIONS THROUGH AUDIOVISUAL FICTION

The experimental study carried out by Igartua and Vega (2016), involved young people between 14 and 20 years old (N=208, M=15.85, women=51.9%), from six cities in Colombia. Participants were randomly divided into three groups to see for the first time one of three episodes of the EE television series *"Revelados, Desde todas las posiciones"*. Each of the chapters dealt with a different topic: 1) Adolescent sexuality, 2) Gender violence and 3) Sexual diversity. Immediately after watching the episode, the participants filled out a questionnaire on identification with the main characters, cognitive elaboration, counter-argumentation and attitudinal measures.

The results indicate that the participants achieved a greater identification with the character related to the preventive behavior promoted in each chapter. This was associated with greater cognitive elaboration, with more favorable attitudes towards sexual decision-making and

towards homosexual men who express themselves openly about their sexuality, as well as a greater rejection of violence against women.

This led researchers to conclude that stimulating thought and reflection on a particular issue can help persuade them. This suggests that narrative persuasion models and dual rhetorical persuasion models may be compatible in certain contexts.

Figure 1

Frame from the Revelados series

Source: Revelados profile on Facebook https://n9.cl/il4ed

3.2. ENTERTAINMENT-EDUCATION NARRATIVE VERSUS NONNARRATIVE INTERVENTIONS TO EDUCATE AND MOTIVATE LATINAS TO ENGAGE IN MAMMOGRAPHY SCREENING

Borrayo et al. (2017) conducted an experimental study in which a group of Latina women in the United States (N = 141, *M* = 51.8, *SD* = 9.8) filled out a questionnaire on knowledge, self-efficacy, normative behaviors, and intentions related to mammography. Then, they were randomly assigned to one of three groups.

The first group (N=41) watched the video *"Where's Maria?"*. It was an 8-minute narrative style video, created in a way that was understandable

to a low literacy Latino audience. Its characters model behaviors such as obtaining a mammogram, reinforcing desired self-efficacy, subjective norms, and behavioral intentions.

The second group (N = 54) was exposed to the video *"Quality Mammography Can Save Your Life"*, also 8 minutes long, which uses a non-narrative and didactic format to present information about mammograms.

The third group (N=46) received three non-narrative printed brochures produced by the *National Cancer Institute* and the *American Cancer Society* and discussed them with a facilitator. These aimed to educate women about breast cancer and mammograms.

The results show that the three formats produced positive results in the knowledge, self-efficacy and behavioral norms of women in relation to mammograms. However, the narrative format video produced significantly higher results in the same variables, where self-efficacy and behavioral norms were moderated by the parasocial relationship of the participants with the characters and their absorption in the narrative of the story.

3.3. EAST LOS HIGH: TRANSMEDIA EDUTAINMENT TO PROMOTE THE SEXUAL AND REPRODUCTIVE HEALTH OF YOUNG LATINA/O AMERICANS

In the United States, Wang and Singhal (2016) analyzed, through a mixed and multi-stage method, the first season of the East Los High series, aimed at young Latinos and addressing sexual and reproductive health issues. The authors conducted an anonymous monitoring of web traffic through Google Analytics and applied a survey to the viewers of the series (100 young Latinas between 12 and 23 years old, and 110 relatives) about their attitudes and behavioral intentions related to sexual and reproductive health. They used scales to measure narrative transport, identification with the characters, and narrative engagement. Finally, they developed a laboratory experiment with a partial factorial design 2 (non-dramatic vs. dramatic narratives) x 3 (text vs. multimedia vs. transmedia) to test the effect of different storytelling formats on the target audience of *East Los High*, but with people who had never seen the series (136 young Latinas between 18 and 28 years old).

The results showed that the series had a wide audience reach, even in geographic areas with large Latino populations, with high rates of adolescent pregnancy and poverty. The adolescents and young people who watched the series consistently demonstrated high levels of narrative engagement, understood the nuances of the characters and their stories, felt immersed in the story by relating its content to their life experiences, actively reflected on the plots, and showed themselves emotionally engaged.

Regarding the laboratory experiment, it was found that transmedia produced significantly better results than other conditions over time and that this is probably due to the fact that it was used to highlight the critical and precise information incorporated in the dialogue with a main character.

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Figure 2

"East Los High" Series

Source: hdreport series https://cutt.ly/Chotrzt

3.4. WHO CARES WHAT OTHERS THINK? THE ROLE OF LATINAS' ACCULTURATION IN THE PROCESSING OF HPV VACCINATION NARRATIVE MESSAGES

In an experimental study, Walter et al. (2017) had the participation of 186 Mexican American women (*M* = 40, *SD* = 5.23; between 27 and 40 years of age), who were randomly assigned to a condition of narrative visualization (Tamale Lesson) or non-narrative (Interviews + information). The content of both films deals with the importance of the prevention and detection of the Human Papilloma Virus [HPV]. After watching the films, the participants filled out a questionnaire to verify the visualization and knowledge related to the preventive message. Two weeks later they filled out another questionnaire designed to measure the constructs of the study: the intentions to vaccinate their adolescent child, descriptive and precautionary social norms, and the moderating variable "level

of acculturation" (how much they are attached or not to the culture North America), adding to this the measurement of socio-demographic and health-related variables, including general health, education, marital status, health coverage, among others.

Contrary to the hypothesis, the results showed that exposure to the story related to the HPV vaccine did not have a direct effect on research results, including normative beliefs and behavioral intentions (vaccination of their children). However, acculturation was shown to significantly moderate the effect of narrative exposure on descriptive norms. That is, the *Tamale Lesson* story had stronger effects on normative beliefs for less acculturated participants compared to participants in the non-narrative condition and/or more acculturated women. In summary, the authors demonstrate in their research the importance of the narration containing characters and stories similar to the culture of their audience, thus they can improve educational strategies in preventive health.

Figure 3

"The Tamale Lesson: Narrative Education on Cervical Cancer"

Source:Tamale Lesson https://youtu.be/Lyhv9KmLroc

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3.5. NARRATIVE FORMATS FOR TEENAGE PREGNANCY PREVENTION. THE EFFECT OF THE NARRATIVE MODALITY ON PREVENTIVE ATTITUDES

In their experimental study, González-Cabrera and Igartua (2018) used the format of a video (direct address testimonial and first-person point of view vs. dialogic) created to prevent unintended adolescent pregnancy in Ecuador. The adolescent participants of the study (*M = 16.19, SD = 0.92*; 15 to 19 years of age) filled out a pre-test questionnaire in which the level of media literacy was measured, focused on the critical ability to perceive the sexualized content of the media, since it was expected to determine if the level of literacy would moderate the effect of the video (testimonial vs. dialogic) on the outcome variables. In the pre-test, the measured variables were: attitudes towards appropriate sexual behaviors, perception of vulnerability and risk, knowledge and intention of preventive behavior. One month later, the participants were randomly distributed to the two experimental conditions: half watched a narrative video in testimonial format and the other half a narrative video in dialogic format. Then, they filled a post-test questionnaire on variables of the receptive process: identification with the characters, narrative transport, counter-argumentation, enjoyment, realism and personal resonance; as well as the result variables to check for any changes in them.

The results showed that the level of media literacy did moderate the indirect effects of the testimonial narrative video on the perception of the risk of experiencing negative situations in an adolescent pregnancy, since the testimonial format (as opposed to the dialogic) increased the perception of risk through the induction of a high narrative transport, but exclusively in people with a low level of media literacy. This research indicates which variables can moderate the narrative process and the level of media literacy, an individual difference that, as has been proven, can condition the effects of the narratives on the perceptions of risk that, as in this case, entail an unwanted pregnancy.

Figure 4

"What we do not think" Experimental condition of testimonial video vs. dialogical video

Condición experimental

Source: González-Cabrera e Igartua (2018)

3.6. HOW IN-FILM PRODUCT PLACEMENT STIMULATES FAST FOOD CONSUMPTION IN DEVELOPING COUNTRIES

Redondo and Bernal (2020) exposed 812 Chileans (between 18 and more than 41 years old) to the visualization of two versions of the North American film *The Good Lie*, the experimental intervention group saw the film with the scenes in which the characters (migrants) ate and enjoyed McDonald's products, while the control group watched the film without those scenes. After the film, the participants filled out a questionnaire where they chose between a McDonald's or Subway menu (dependent variable). Attitude towards the McDonald's brand was also measured and several items were adapted from previous studies that measured: narrative transport, identification with the characters, perceived realism, enjoyment, and other elements that allowed to verify if they saw the film.

Through a logistic regression model, it was determined that the visualization of content related to McDonald's embedded in the film produced an increase in the choice of McDonald's, this occurred because the participants identified with the characters and were transported by the story. Therefore, the authors emphasize the need to undertake educational initiatives so that consumers in developing countries learn how *product placement* takes advantage of audience receptivity to improve attitudes towards fast food and encourage its consumption, which is not convenient for their health.

Figure 5

"The Good Lie"

Source: Website oficial https://www.warnerbros.com/movies/good-lie

4. DISCUSSION

4.1 LOW NUMBER OF HEALTH INTERVENTIONS BASED ON EE STRATEGIES

The results show that there are few publications of evaluations carried out on narrative persuasion in EE strategies in health issues. The country that has studied the most on the subject with a Latino population is the United States.

This absence of publications can be explained by: 1) prevention in health issues in this region has not necessarily prioritized this type of EE strategies, 2) countries do not carry out this type of prevention strategies in health that implement EE, either due to budget limitations or lack of knowledge, 3) there are few published and open access research on narrative persuasion.

In the first case, despite the evidence on the importance and utility that the literature confers on EE strategies in generating changes in the audience on health issues (Dillard et al., 2010; Falzon et al., 2015), it is evident that knowledge about these strategies has hardly been identified and assumed as a cognitive process and as a health communication strategy by institutions and researchers working on these issues in the region.

In the second case, it is generalized that there are not always sufficient resources to assume the costs of production and evaluations of this type of EE strategies in Latin American countries.

In the third case, although little research is being generated, it is observed from the number of articles found that in recent years there has been awareness that health communication strategies cannot be thought of in a massive way and by mass media (Vega et al., 2020). These strategies must be designed for specific population groups, adapted for each context and for academic purposes that allow scientific validation.

4.2. HEALTH PROBLEMS ADDRESSED IN RESEARCH

In general, the health problems that have been considered in the reviewed research are lack of information on reproductive sexual health and how to prevent unintended teenage pregnancy, cervical cancer caused by HPV, breast cancer and problems derived from an improper diet.

It should be noted that one of the social problems in Latin America that have become public health problems is unintended adolescent pregnancy (González-Cabrera and Igartua, 2018; Igartua and Vega, 2016). Figures from the National Institute of Statistics and Censuses (INEC) indicate that in 2019, of the total number of pregnancies that occurred and were registered in that year, 17.5% were adolescents between 15 and 19 years of age, and 0.6% were adolescents between 10 and 14 years of age.

Also in Colombia, the Ministry of Health indicates in the document "Analysis of the Health Situation (2019)" that adolescent pregnancy, despite having shown a reduction in the last decade in the group of women aged 15 to 19, had 75 to 61 live births per 1000 women, in the 10 to 14 age group it remains at 3 live births per 1000 women.

For this reason, it is evident that most of the health communication interventions found in this review address the problem of the lack of information on sexual and reproductive health in young people, because the figures issued

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by government entities are alarming and it is necessary to target communication strategies that help educate young people in sexual and reproductive health, and in how to prevent unintended adolescent pregnancy.

One of the studies found in this review addresses an audiovisual piece aimed at the Latino population in the United States that promotes the Pap smear test for the early detection of the Human Papilloma Virus, a recognized precursor of cervical cancer (Walter et al., 2017). This issue corresponds to the worrying rate of new cases of cervical cancer in Hispanic women in that country (8.9 per 100,000 women), even higher than that of any other ethnic group (Centers for Disease Control and Prevention, 2020).

However, the type of cancer that most affects Hispanic women in the United States is breast cancer, which has an incidence of 94.5 per 100,000 women and the highest mortality rate among the different types of cancer (13.5 for each 100,000 women). Hence the relevance of studies such as that of Borrayo et al. (2017) which verified the efficacy of three different communication formats to improve knowledge, self-efficacy and behavioral norms of women in relation to mammograms, a fundamental diagnostic test for the early detection of breast cancer.

According to the work of Redondo and Bernal (2020), it is worth mentioning that one of the fastest growing public health problems in recent years in Latin America and the Caribbean is obesity and overweight, according to the United Nations Regional Overview of Food Security and Nutrition (FAO et al., 2019). Chile, the country where the study was carried out, is no exception to this trend. Obesity and overweight present a high and increasing prevalence from the first years of life, to the point that more than 60% of the population has some degree of excess weight (PAHO, 2020).

In sum, research carried out in other countries has used and verified the effectiveness of narratives in various areas of health such as: the promotion of physical activity (Falzon et al., 2015), the importance of a healthy diet (Oh and Larose, 2015; Staler et al., 2003), the mitigation of the stigma related to depression (Zhang and Wen, 2020), the promotion of the hepatitis B vaccine (de Wit et al., 2008), organ donation (Reinhart et al., 2007), condom efficacy (Collins et al., 2003), emergency contraception and human papillomavirus (Brodie et al., 2001), HIV (Kennedy et al., 2004), and breast cancer (Beck, 2004; Hether et al., 2008; Wilkin et al., 2007).

4.3. RESEARCH METHODS AND DESIGNS

The six related investigations in this review were developed under a quantitative approach and have a causal scope. All used experimental designs, however, Wang and Singhal (2016) developed a multi-method study in addition to the experiment.

Among the limitations of the studies analyzed, one of them refers to the type of format used. For example, González-Cabrera and Igartua (2018) emphasize that having worked with narrations in audiovisual format instead of written narrations could be a limitation, since Tukachinsky (2014), in his meta-analysis on the effectiveness of experimental manipulations of the mechanisms that intervene in the narrative process, found smaller effects in the stimuli through videos than in printed formats or video games.

On the other hand, Walter et al. (2017) mention as a limitation the fact that the study has focused on a specific subpopulation (Mexican

Americans), a particular health risk (contracting HPV) and a single stimulus (narrative vs. non-narrative), which can cause problems of external validity and generalizability. Their hypotheses concerned perceptions about HPV vaccination, however, their sample was not limited to parents of adolescents (target audience), posing a notable threat to the interpretation of the results. Finally, they mention the results regarding the normative beliefs variable, since the meta-analytic evidence on persuasion suggests that normative constructs are a weak predictor of behavioral intention. Therefore, they suggest not taking for granted the ability of normative beliefs in narratives to influence health-related behavior.

Likewise, Redondo and Bernal (2020) point out as an important limitation having used a specific type of product placement (McDonald's fast food), therefore, they suggest that future research consider three types of location that could potentially lead to different results. For example, the branding should be prominent enough to the plot of the film in terms of visibility, length, and relevance. It should play a role related to the thoughts, conversations and actions of the characters, and not appear artificially within the story, as viewers could perceive an inappropriate commercial intrusion and reduce their level of immersion in the story or offer more resistance to adopt attitudes consistent with the content of the narrative.

5. CONCLUSIONS

This review contributes to understanding the status of the evaluation of narrative persuasion based on EE strategies in Latin America. In the first place, there is concern about the low number of published and open access articles on health interventions based on EE strategies in narrative persuasion that have been developed in Latin America to date. This may be due to the lack of knowledge about the effectiveness of EE strategies in generating changes in the audience on health issues and the limited budgets that our region must address these issues.

Second, it is observed that most of the topics addressed in the research refer to sexual and reproductive health, the prevention of adolescent pregnancy, cervical cancer caused by HPV, breast cancer and problems related to an improper diet. The fact of addressing these issues can be explained as a response of institutions, researchers and workers in the health area to the worrying figures reported by entities such as the National Institute of Statistics and Censuses (INEC) and the Ministry of Health (2019) referring these issues, which have become a priority in preventive efforts in this region.

Third, in terms of the methodology and designs of the investigations analyzed in this review, it is observed that all have a quantitative approach with experimental designs. This shows that the investigations are being developed with great rigor and with the aim of making scientific contributions to the health communication area in Latin America.

As limitations of this integrative review, it was observed that there are very few published open access articles that report results on the analysis of narrative persuasion on interventions with EE strategies in Latin America. This limited the analysis due to the small number of documents found and is a major challenge, both for health institutions and academia. It is key to generate alliances that allow the design of EE strategies designed for the Latin American population and design studies with sophisticated methodologies that allow finding evidence of the great contributions that EE strategies can make in different health behaviors through narrative persuasion mechanisms. In this way, there would be references for greater rigor and strength from the very planning, production and evaluation of EE strategies based on the evidence.

For future research in this field, it is advisable to continue investigating the effectiveness of EE presentation formats, the variables that moderate and mediate the narrative persuasion process, and to continue addressing prevention issues in adolescents and groups at risk both in the area of sexual and reproductive health and sexually transmitted diseases. In other population groups, other health problems caused by risky behaviors can be addressed, such as driving under the influence of alcohol, smoking, excessive consumption of drugs and alcohol, lack of information on prevention of skin and breast cancer, etc. In addition, much remains to be investigated in sensitive topics that affect health, such as organ donation.

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