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DIGITAL COMPETENCIES OF TEACHERS IN ELEMENTARY EDUCATION: CHALLENGES AND POSSIBILITIES IN THE USE OF DIGITAL TECHNOLOGIES

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ABSTRACT

Objective: This article aims to identify and promote reflections on the challenges faced by elementary school teachers in the use of Digital Information and Communication Technologies (DICT) in their teaching practices.

Theoretical Framework: The research is based on the investigation of teachers' digital skills, based on the European DigCompEdu framework, in line with Brazilian public policy: the Connected Education Innovation Program.

Method: To this end, an exploratory-descriptive study was conducted using a mixed approach with qualitative and quantitative aspects. Snowball sampling was used to locate the research subjects, resulting in 47 teachers from the states of Minas Gerais and São Paulo who work in schools covered by the Program.

Results and Discussion: The data revealed that, although there have been advances in technological integration policies, challenges and difficulties still persist, such as inadequate infrastructure, unstable connections, lack of technical support, and teacher resistance to the use of TDICs. Gaps were also identified in relation to continuing education and insecurity regarding the handling of digital resources.

Research Implications: Therefore, in addition to investing in infrastructure, it is essential to expand continuing education policies planned in a way that respects the reality of teachers, encouraging innovative and critical pedagogical practices aligned with contemporary demands.

Originality/Value: The more effective integration of TDICs into basic education therefore requires integrated strategies that consider the structural, technical, human, and training aspects of teaching practice.

Keywords: teaching competence, teachers, elementary school, technology and education, Sustainable Development (SDGs).

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1 INTRODUCTION

This article is an excerpt from a master's thesis entitled: "Teaching practice and digital competence in elementary school: the integration of Digital Information and Communication Technologies (DICT) in the school context from a CTS perspective," presenting the studies and main results of the research conducted. Thus, the study addresses aspects of teachers' digital competencies, with an emphasis on the use of Digital Information and Communication Technologies (DICT), in addition to briefly discussing the public policy of the Connected Education Innovation Program.

We live in a society permeated by the constant circulation of information and multiple possibilities for interaction between people, promoted, in large part, by TDIC. However, the introduction of these technologies in the context of public education is still occurring at a slower pace. Despite this, their role in promoting learning is undeniable, especially in a globalized scenario, in which access to information is broad and diverse (Falcão, 2015).

In the educational scenario, TDICs have promoted significant changes by integrating pedagogical approaches that favor more meaningful learning and active student participation, making the teaching and learning process more interactive (Trindade; Silva, 2022). However, many teachers still lack experience in using these technologies, which makes it essential to implement continuing education programs so that they can keep up to date with new digital tools. In addition to facilitating communication, TDICs enable research on a wide range of topics and access to information, expanding opportunities for learning and knowledge exchange.

However, teachers face several obstacles, especially with regard to adapting to social changes, including changes in legislation, which require teachers to improve their digital skills. According to Pamplona (2021), digital skills go beyond simply learning technological skills. They also involve acquiring knowledge, values, behaviors, norms, and ethics in the use of digital tools, with the aim of exploiting their full potential.

In this sense, it is essential that there are public policies that guarantee educational institutions the necessary infrastructure and access to TDIC, in

addition to supporting teachers in improving their digital skills. This can be achieved through continuous training and capacity building, which favor the critical and responsible use of digital educational tools.

In Brazil, the 2014 National Education Plan (PNE) stands out as a milestone in educational legislation focused on the use of digital technologies. Structured around goals and strategies to be achieved over ten years, the PNE aims to promote changes in the education sector (Silva; Casagrande, 2020). Goal 7, for example, seeks to improve the quality of basic education and school performance, with a focus on implementing quality connectivity in public schools. The goal also includes the selection and certification of technologies for early childhood, elementary, and secondary education, aiming to improve teaching and pedagogical methodologies (Brazil, 2014). In addition, the PNE emphasizes the continuing education of teachers and the availability of digital resources, which led to the creation of the Connected Education Innovation Program, regulated by Decree No. 9,204 of 2017 (Brazil, 2017).

In 2021, Law No. 14,180 established the Connected Education Innovation Policy (PIEC), with the objective of universalizing access to high-speed internet and promoting the use of digital technologies in basic education, favoring the teaching and learning process (, 2021). Through this program, financial resources are provided to public basic education schools to enable access to and use of TDICs in the educational context. In order for these resources to be transferred, educational institutions must meet certain criteria defined by law, with the aim of ensuring the contracting of internet access services, the implementation of infrastructure to distribute the internet signal in schools, and the acquisition of electronic devices (Brazil, 2019).

In the context of teachers' digital skills, the European Digital Competence Framework for Educators (DigCompEdu), published in 2017, which addresses the improvement of skills among teachers in Europe, is noteworthy. Its purpose is to support efforts at the national, regional, and local levels to enhance teachers' digital competence. To this end, a common reference framework was developed (Pamplona, 2021), which we believe is relevant to apply to the Brazilian context.

Based on the above, it is clear that teachers seeking to improve their digital skills must be aware of the various educational spaces where teaching takes place, promoting the active participation of students and encouraging them to seek solutions to problems both inside and outside the school environment. In this way, a digitally competent teacher is able to enrich their pedagogical practices, facilitating the development of learning related to the use of TDIC (Lucas; Moreira, 2018).

This article presents the results of questionnaires administered to teachers in the states of Minas Gerais and São Paulo who work in schools benefiting from the Connected Education Innovation Program. A total of 47 elementary school teachers responded to the questionnaire. Among these participants, the responses of those who pointed out the main challenges for the use of TDIC in the school context stand out. Although they are part of a globalized reality, with multiple means of communication and public policies that encourage the use of TDIC, teachers still face several difficulties in effectively incorporating them into their teaching methodologies. Given this, this study aims to identify and promote reflections on the challenges faced by elementary school teachers in the use of TDIC in their pedagogical practices. To this end, the article begins with an introduction that addresses general aspects of the theme, followed by a brief contextualization of DigCompEdu and the Connected Education Innovation Program, the methodological approach applied, and, finally, the main challenges reported by teachers, who, amid the intensification of the use of digital resources in society, still face obstacles to incorporating them into their teaching contexts.

2 TEACHING DIGITAL COMPETENCE: DIGCOMPEDU AND POLICIES TO SUPPORT TECHNOLOGICAL INTEGRATION

DigCompEdu was published in 2017 by the European Commission's Joint Research Centre (JRC), entitled European Framework for the Digital Competence of Educators: DigCompEdu, translated into Portuguese by Margarida Lucas and António Moreira. The document is the result of extensive collaborative work between the JRC and experts in the field, involving

literature review, theoretical analysis, and the systematization of various instruments focused on digital competences in the contemporary educational context. Its main purpose was to define a common framework for identifying the main dimensions and components of teachers' digital competences. In summary, the framework brings together and organizes existing tools and concepts on the development of digital competence in teachers in the educational field (Lucas; Moreira, 2018).

DigCompEdu offers relevant support for the formulation of educational policies in different contexts and levels of education. As it is an already structured reference, it can be adapted to local specificities, respecting the realities and needs of each educational system. Its central proposal is to enable the identification and description of the digital competences of both teachers and learners[3] . model is intended for educators at all levels, aiming to support self-assessment and improvement of teaching digital competence, providing practical guidance on the pedagogical use of digital technologies with a focus on innovation and improvement of the educational process (Lucas; Moreira, 2018).

The digital competencies attributed to educators and learners are organized into three broad categories: "educators' professional competencies," "educators' pedagogical competencies," and "learners' competencies." These categories are divided into six distinct areas, totaling 22 competencies. The first area refers to professional engagement, which involves the use of digital technologies for communication, collaboration, and continuous development. The second addresses the use of digital resources, including the selection, production, and sharing of these materials. The third area focuses on the management and application of TDIC in the teaching and learning process. The fourth is focused on the integration of digital technologies into assessment processes. The fifth area deals with the use of TDIC to promote student inclusion and engagement. Finally, the sixth area focuses on developing students' digital competence, encouraging the creative, critical, and responsible use of technologies (Lucas; Moreira, 2018).

[3]Within the scope of DigCompEdu, the term "learner" refers broadly to any individual involved in knowledge acquisition processes, whether in formal, non-formal, or informal learning contexts (Lucas; Moreira, 2018). The authors use the term in this case to refer to students.

In addition to the competency framework presented by DigCompEdu, there is a complementary self-assessment tool called "Selfie for Teachers." Through it, teachers can answer questionnaires that generate a diagnosis based on progression levels from A1 (beginner) to C2 (advanced), inspired by the Common European Framework of Reference for Languages (CEFR). This system seeks to guide teachers in identifying their digital skills and areas that need improvement. For each DigCompEdu competency—such as professional engagement, digital resources, teaching and learning, assessment, learner empowerment, and promoting learners' digital competence—there is a specific progression. The goal is not to classify or measure performance, but to encourage reflection and support the continuous development of pedagogical practices using TDIC (Lucas; Moreira, 2018).

The adoption of DigCompEdu allows for a more comprehensive and organized understanding of teachers' digital competences, as it contemplates multiple dimensions of pedagogical practices with technology, such as leadership, assessment, and professional collaboration. More than a reference, the model functions as a self-assessment tool, enabling teachers to reflect on aspects such as their professional engagement, the use of digital resources, assessment strategies, and the impact on the teaching and learning process (Gilioli; Melo; Dias-Trindade, 2019). With a flexible structure that can be adapted to different educational contexts, DigCompEdu stands out for covering a wide range of digital skills. Its progression proposal offers a structured path for improving pedagogical practices, promoting a more conscious and effective integration of digital technologies in the educational environment (Cunha-Melo, 2015).

The participants in this research were teachers from schools that have already received resources from the Connected Education Innovation Program. This program offers several initiatives aimed at integrating technology into basic education schools. Among its actions are technical support to institutions to create diagnostics and pedagogical innovation plans, as well as financial and technical assistance for contracting internet services, implementing infrastructure for signal distribution in schools, and acquiring electronic equipment and digital educational materials (Brazil, 2017).

In addition, the program promotes continuing education for teachers in the use of technologies in teaching, trains coordinators to implement the policy, and provides guidance on contracting internet services and the necessary infrastructure in schools. It also offers free digital teaching resources on online platforms and supports the development of digital teaching resources, with an emphasis on making open access materials available (Brazil, 2017).

Considering the above, it is important to note that this research used the areas and competencies of DigCompEdu, as well as elements of the Selfie for Teachers instrument to develop the questionnaire. However, the questionnaire was adapted to the Brazilian context, prioritizing clear and objective language, with less repetition and focusing on optimizing response time. The goal was to increase teacher participation, making the application more accessible and appropriate to the reality of national public schools. Thus, research participants were selected from schools that had already received resources from the Connected Education Innovation Program, since this program aims to provide resources to schools that adhere to internet connectivity and the acquisition of electronic devices. It is believed that these schools have some structure in place for the use of TDIC and the improvement of teachers' digital skills.

3 METHODOLOGICAL PROCEDURES

To achieve the objective proposed in this study, exploratory-descriptive research was conducted. This type of research aims to identify, organize, and systematically present the aspects that make up the object of investigation. Exploratory research, in particular, seeks to broaden understanding of a given topic, assisting in the definition of data collection instruments, as well as in the management of time and available resources. In addition, this approach is useful for assessing the relevance and feasibility of the topic studied, and can provide a basis for more in-depth descriptive research (Sampaio, 2022).

According to Sampaio (2022), the main purpose of descriptive research is to represent and detail a specific reality, considering aspects such as sociodemographic profile, quantitative data, issues identified in the field, and other contextual variables. This approach makes it possible to observe and

analyze relationships between the elements studied, allowing for both qualitative and quantitative methods. In many cases, such as in this study, it is used to complement exploratory research, offering greater insight into the topic based on the description of data such as the age group, gender, and educational level of the participants.

This study adopted a mixed methodological approach, integrating quantitative and qualitative procedures. According to Gatti (2004), methods based on numerical data are useful for analyzing certain educational phenomena and can reveal relevant patterns. However, when combined with information obtained through qualitative analysis, they become even more effective in broadening the understanding of the problem studied and pointing to possible solutions. For Ludwing (2014), qualitative research seeks to interpret the meanings attributed by subjects to the events they experience, which, in this study, is related to teachers' perceptions of their digital skills and the effects of these skills on their teaching practices. Thus, the combined use of data obtained through questionnaires with open and closed questions allows for a better analysis of the topic under investigation (Dal-Farra; Lopes, 2014).

The questionnaire used in this research was developed based on the areas of DigCompEdu and elements of the “Selfie for Teachers” instrument, covering aspects such as the digital resources used in teaching practices. To define the participants, the chain sampling technique, also known as “snowball sampling,” widely used in qualitative and social studies, was adopted. This non-probabilistic approach is based on successive referrals, in which each respondent suggests other possible participants, allowing subjects with the desired profile to be reached (Vinuto, 2014; Albuquerque, 2009). The process began with the identification of key people in the educational context—called seeds—who, based on their contact networks, helped expand the sample (Vinuto, 2014). This strategy enabled access to teachers with experience in the use of TDIC, according to the research criteria.

To ensure the ethical aspects involved in this investigation, a Free and Informed Consent Form (FICF) was prepared for the participating teachers. The document was submitted for review by the Research Ethics Committee (CEP) of the Federal University of São Carlos (UFSCar) through the Brazil Platform and

was duly approved in accordance with the guidelines of Resolution 510/2016 - Norms applicable to research in the Humanities and Social Sciences, which regulates research involving human beings in the field of humanities and social sciences. The approval of the TCLE ensures that all participants have full knowledge of the objectives, procedures, and possible outcomes of the study, in addition to guaranteeing the right to refuse or withdraw at any time, without prejudice. It should also be noted that all data collected were treated with strict confidentiality ( ), ensuring the anonymity and confidentiality of the information provided, in accordance with the ethical principles of scientific research.

4 RESULTS AND DISCUSSIONS

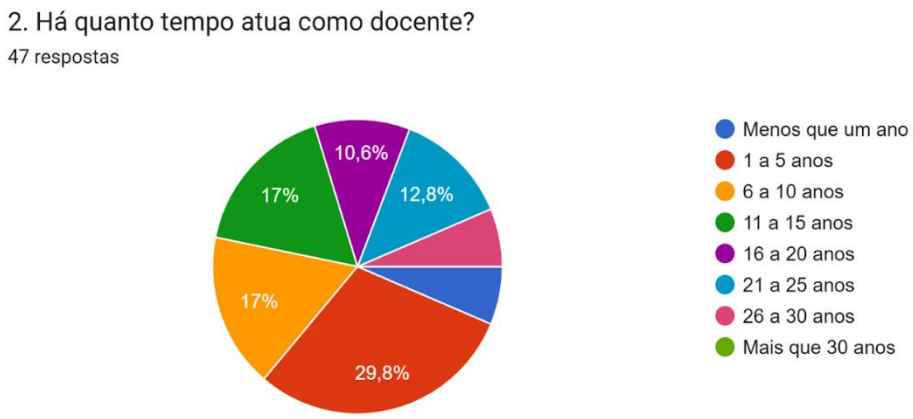
The teachers participating in this study work in elementary schools located in the states of Minas Gerais and São Paulo, both of which have already received funding from the Connected Education Innovation Program. A total of 47 questionnaires were returned in accordance with the research criteria, i.e., only responses from elementary school teachers were considered. Among the respondents, 13 teachers reported only the class or subject, without identifying both. Of the others, 24 work in the early years of elementary school (1st to 5th grade); among them, there is one teacher who teaches all subjects (Portuguese language, mathematics, science, geography, history, arts, religious education), including physical education. In addition, two teachers teach English, comprising a teaching staff focused on the integral development of students at this stage.

With regard to teachers working in the final years of elementary school (6th to 9th grade), six identified the subjects and classes they teach: mathematics (four), geography (one), and arts (one). Also noteworthy is the presence of a teacher responsible for the reading room, who serves both the early and late years of elementary school, with the aim of fostering reading habits among students throughout this stage of basic education. There is also a physical education teacher who teaches both stages of elementary school.

Of the total number of respondents, 25 are between 26 and 39 years old, 21 are between 40 and 59 years old, and only one is between 18 and 25 years old. In terms of gender, 38 identify as female and nine as male. In terms of geographic distribution, 23 teachers work in the state of Minas Gerais and 24 in the state of São Paulo. As for the location of the schools, four teachers work in rural areas, while 43 teach in urban schools. In terms of the education network, 17 teachers work in municipal schools, 28 in state schools, and two teach simultaneously in both networks (state and municipal). The length of time spent teaching varies greatly among participants, as shown in Graph 1.

Graph 1

Representation of teachers' length of service.



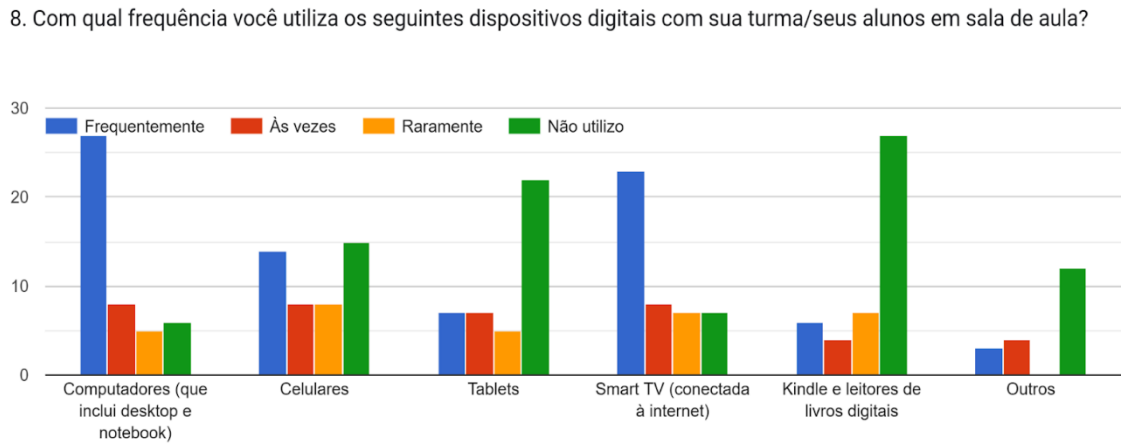
Source: Research data.

The largest percentage of teachers participating in the survey have between 1 and 5 years of experience, corresponding to 29.8% of the total. This data indicates a significant presence of professionals at the beginning of their careers. Next are two groups with equal percentages of 17%: teachers with 6 to 10 years and 11 to 15 years of experience, representing an intermediate stage in their professional careers. The group with 21 to 25 years of teaching experience corresponds to 12.8%, followed by 10.6% of teachers with 16 to 20 years of experience. Finally, there is a smaller percentage of 6.4% among teachers with less than one year of experience and those with 26 to 30 years of experience, making the extremes of the teaching career the least representative in the group investigated. In addition to length of service, the

frequency with which teachers use digital devices in the classroom was also investigated.

Graph 2

Frequency of use of digital devices in the classroom.

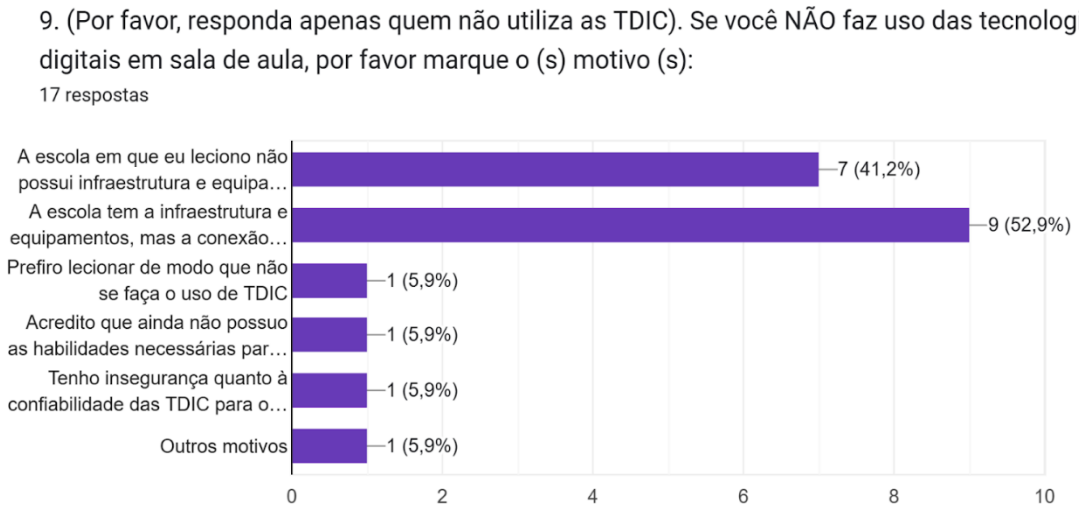


Source: Research data.

Based on the data in Graph 2, it can be observed that the technological resources most frequently used by teachers are computers (desktops and notebooks), mentioned by 27 participants, followed by smart TVs with internet access, used by 23 teachers. These two devices represent the main technological means employed in the school context by the teachers in the sample. With regard to non-use, the most significant data refer to digital readers, such as Kindle, with 27 responses indicating disuse, and tablets, with 22 teachers reporting that they do not use them in their teaching practices. In the "others" option, some teachers marked "I don't use," one of the reports exemplifying this reality by stating: "There are no digital tools such as Smart TVs and others available. School activities are carried out using more traditional resources, such as blackboards, chalk, and paper." In addition, the use of data projectors and digital whiteboards were cited as complementary resources, indicating that some schools are seeking alternatives to integrate technology into teaching. Graph 3 shows in more detail the reasons why some teachers do not use TDIC in their educational institutions.

Graph 3

Factors influencing the absence of TDIC in the classroom.



Source: Survey data.

Of the total number of survey participants, 17 teachers pointed out the factors that hinder the use of Digital Information and Communication Technologies (TDIC), with the possibility of selecting more than one alternative. The most common alternative was: "The school has infrastructure and equipment, but the internet connection is not stable," indicated by nine teachers. Next, seven teachers indicated: "The school where I teach does not have the infrastructure and equipment to use digital resources." Other less frequently chosen responses included: “I prefer to teach without using DICT” (one teacher); “I believe that I do not yet have the necessary skills to use DICT effectively” (one teacher); and “I am unsure about the reliability of DICT for educational work” (one teacher). In addition to the alternatives offered, one teacher selected the option “Other reasons” and described the following situation: “When I need to use the computers, they don’t turn on; when they do turn on, they don’t work properly or connect to the internet. The same is true for TVs and projectors.”

Despite advances in public policies aimed at integrating digital technologies into Brazilian education, the survey data reveal that challenges remain for their effective use in teaching practices. Even with initiatives such as the Connected Education Innovation Program, many teachers face structural

and technological limitations, such as the lack of adequate equipment or unstable internet connections, as well as barriers related t , such as insecurity in the use of technologies and a lack of specific skills. These factors demonstrate that the mere existence of policies does not, in itself, guarantee the qualified integration of TDICs into everyday school life, requiring investment in infrastructure, teacher training, and ongoing pedagogical support.

Regarding other challenges reported by teachers, the last question on the questionnaire allowed participants to add free comments if they wished to mention aspects not covered in the previous questions. Among the comments, one teacher highlighted the structural limitations in the use of TDIC, stating: "I use digital technologies in class for films and/or explanatory videos on a topic covered in class. The school's resources are limited, and the internet is sometimes insufficient for the demands." Another teacher emphasized the lack of specialized professionals for technical support in schools, which compromises the efficient use of technological devices. According to his report: "Schools do not have an employee with specific training to act as a supervisor in the computer room. There should be someone trained in the field to assist with handling the equipment and anything else related to IT." These reports show that, in addition to infrastructure and teacher training, the presence of technical support teams is also a determining factor for the effective implementation of TDIC in the school environment.

One comment that stands out among the challenges faced by teachers highlights the resistance to the use of digital technologies in the classroom, often motivated by a generational gap and the permanence in pedagogical comfort zones: "[...] what worries me most are teachers who do not use or even try to use these resources in the classroom. The generational gap and, above all, convenience are factors that hinder the implementation of these technologies [...]". This position highlights a critical reflection on challenges that go beyond inadequate infrastructure, unstable internet connection, equipment shortages, or lack of training. The teacher highlights a subjective but relevant factor: the resistance of some teachers to incorporate TDIC into their practices, even with the resources available. Such resistance may be

associated with technological insecurity or accommodation in the face of the changes required.

In this context, innovation in teaching requires not only the availability of technological resources, but also the provision of training environments that value experimentation, welcome teachers' insecurity in the face of the new, and encourage pedagogical practices aligned with the demands of contemporary society. Thus, the importance of offering free, high-quality continuing education promoted by educational networks is reinforced. These training courses should be planned in such a way as not to overload teachers, but rather to support them in adopting new methodologies and in the effective pedagogical use of digital technologies.

5 FINAL CONSIDERATIONS

The data analyzed in this study show that, although there are national public policies aimed at integrating TDICs into basic education, such as the Connected Education Innovation Program, significant obstacles still exist that compromise their effective implementation in schools, as highlighted by the teachers participating in this study.

Structural limitations, such as the lack of adequate equipment and unstable internet connections, continue to be recurring barriers, especially in certain regions or institutions with less technical support. In addition, the absence of specialized professionals to provide support in the use of digital resources in schools was also highlighted as a factor, evidencing difficulties for teachers in handling the devices.

At the same time, subjective aspects, such as insecurity regarding the use of TDIC and resistance on the part of some teachers—often associated with complacency or lack of institutional incentive—also pose significant challenges. Such approaches reveal that simply making resources available is not enough, and that it is necessary to promote change and adaptation in the school environment in order to introduce TDIC.

Thus, it is important that public policies be broader and more integrated, considering not only technological infrastructure but also the value of

continuing education and pedagogical support. Training should be offered that respects the reality and workload of teachers and is focused on pedagogical practice, in addition to promoting actions so that TDIC are used in a critical, responsible, and creative manner. These points can contribute to the meaningful incorporation of TDIC into the teaching and learning process.

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REFERENCES

ALBUQUERQUE, Elizabeth Maciel de. **Avaliação da técnica de amostragem respondent-driven sampling na estimação de prevalências de doenças transmissíveis em populações organizadas em redes complexas.** 2009. 99 f. Dissertação (Mestrado em Saúde Pública) - Escola Nacional de Saúde Pública Sergio Arouca, Fundação Oswaldo Cruz, Rio de Janeiro, 2009. Disponível em: https://www.arca.fiocruz.br/handle/icict/2411. Acesso em: 01 maio. 2025.

BRASIL. **Decreto nº 9.204, de 23 de novembro de 2017.** Institui o Programa de Inovação Educação Conectada e dá outras providências. Diário Oficial da União, Brasília, 23 nov. 2017. Disponível em: https://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2017/Decreto/D9204.htm. Acesso em: 28 mar. 2025.

BRASIL. **Lei nº 13.005, de 25 de junho de 2014.** Aprova o Plano Nacional de Educação - PNE e dá outras providências. Diário Oficial da União, Brasília, 25 jun. 2014. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2014/lei/l13005.htm. Acesso em: 28 mar. 2025.

BRASIL. **Lei nº 14.180, de 1º de julho de 2021**. Institui a Política de Inovação Educação Conectada. Diário Oficial da União, Brasília, 2021. Disponível em: https://www.in.gov.br/en/web/dou/-/lei-n-14.180-de-1-de-julho-de-2021-329472130. Acesso em: 15 jan. 2023.

BRASIL. Ministério da Educação. **Portaria nº 29, de 25 de outubro de 2019.** Define critérios da fase de expansão do Programa de Inovação Educação Conectada, para repasse de recursos financeiros às escolas públicas de educação básica em 2019. Diário Oficial da União, Brasília, 25 out. 2019. Disponível em: https://www.in.gov.br/en/web/dou/-/portaria-n-29-de-25-de-outubro-de-2019-224154299. Acesso em: 28 mar. 2025.

CUNHA-MELO, J. R. Indicadores Efetivos da Internacionalização da Ciência. **Revista do Colégio Brasileiro de Cirurgiões,** 42(Suplemento 1), p. 20-25, 2015. Disponível em: https://www.scielo.br/j/rcbc/a/YDD9WHn5NbDdZXVVQwYd5rp/?format=pdf&lang=pt. Acesso em: 11 ago. 2024.

DAL-FARRA, R. A.; LOPES, P. T. C. **Métodos mistos de pesquisa em educação:** pressupostos teóricos. Nuances: Estudos sobre Educação, Presidente Prudente, v. 24, n. 3, p. 67-80, 2014. Disponível em: https://revista.fct.unesp.br/index.php/Nuances/article/view/2698. Acesso em: 14 jan. 2023.

FALCÃO, P. M. P. **Estudo sobre as tecnologias digitais de informação e comunicação como mediadoras da construção do conhecimento na percepção de professores em formação e de crianças do ensino fundamental.** 2015. 185 f. Dissertação (Mestrado em Ciência, Tecnologia e Sociedade) – Universidade Federal de São Carlos, São Carlos, 2015.

Disponível em: https://repositorio.ufscar.br/bitstream/handle/ufscar/1145/6685.pdf?sequence=1&isAllowed=y. Acesso em: 11 ago. 2024.

GATTI, B. A. Estudos quantitativos em educação. **Educação e Pesquisa**, São Paulo, v. 30, n. 1, p.11-30, jan./abril, 2004. Disponível em: https://www.scielo.br/j/ep/a/XBpXkMkBSsbBCrCLWjzyWyB/?format=pdf&lang=pt. Acesso em: 15 jan. 2023.

GILIOLI, S; MELO, I. B; DIAS-TRINDADE, S. Avaliação do nível de proficiência digital de professores: um estudo no Estado de Tocantins. **Revista EducaOnline**, v. 13, n. 3, set /dez 2019. Disponível em: https://estudogeral.uc.pt/bitstream/10316/94186/1/1069-2296-1-SM.pdf. Acesso em: 12 ago. 2024.

LUCAS, M; MOREIRA, A. DigCompEdu: quadro europeu de competência digital para educadores. Universidade de Aveiro: UA Editora, 2018. Disponível em: https://ria.ua.pt/handle/10773/24983. Acesso em: 03. Ago. 2024.

LUDWING, A. C. W. Métodos de Pesquisa em Educação. Revista Temas em Educação, João Pessoa, v. 23, n .2, p. 204-233, jul./dez. 2014. Disponível em: https://www.proquest.com/docview/2344220606?pqorigsite=gscholar&fromopenview=true. Acesso em: 15 jan. 2023.

PAMPLONA, C. C. Competências digitais docentes na educação básica: análise em documentos oficiais – Base Nacional Comum Curricular e Quadro Europeu de Competência Digital para Educadores. 2021. 113 f. Dissertação (Mestrado em Educação pelo Programa de Pós-Graduação em Educação Centro de Ciências Humanas e da Educação – FAED) - Universidade do Estado de Santa Catarina – UDESC, Florianópolis, 2021. Disponível em: https://www.udesc.br/arquivos/faed/id_cpmenu/251/Dissertac_a_o_Carina_convertido_16359697301846_251.pdf. Acesso em: 10 ago. 2024.

PAULA, R. C. S. Prática docente e competência digital no ensino fundamental: a integração das Tecnologias Digitais de Informação e Comunicação (TDIC) no contexto escolar da perspectiva CTS. 2025. Dissertação (Mestrado em Ciência, Tecnologia e Sociedade) – Universidade Federal de São Carlos, São Carlos, 2025. Disponível em: https://repositorio.ufscar.br/handle/20.500.14289/22750. Acesso em: 20 nov. 2025.

SAMPAIO, T. B. Metodologia da pesquisa [recurso eletrônico]. 1. ed. Santa Maria, RS: UFSM, CTE, UAB, 2022. Disponível em: https://repositorio.ufsm.br/handle/1/26138. Acesso em: 26 abr. 2025.

SILVA, R. E; CASAGRANDE, M. A. Programa educação conectada: o uso de tecnologia para o cumprimento das metas de educação básica no plano nacional de educação. Cadernos UniFOA, Volta Redonda, n. 43, p.109-120, ago. 2020. Disponível em: https://revistas.unifoa.edu.br/cadernos/article/view/3332/pdf. Acesso em 13 jan. 2023.

TRINDADE, G. A; SILVA, M. D. F. Formação docente para o uso de tecnologias digitais: reflexões sobre a prática docente. Contemporânea – Revista de Ética e Filosofia Política, v. 2, n. 4, mai./jun. 2022. Disponível em: https://revistacontemporanea.com/ojs/index.php/home/article/view/234/168. Acesso em: 13 jan. 2023.

VINUTO, J. A amostragem em bola de neve na pesquisa qualitativa: um debate em aberto. Temáticas, Campinas, SP, v. 22, n. 44, p. 203-220, 2014. Disponível em: https://econtents.bc.unicamp.br/inpec/index.php/tematicas/article/view/10977. Acesso em: 31 mar. 2024.