LUMEN ET VIRTUS
ISSN: 2177-2789

CONTINUING TEACHER TRAINING FOR DIGITAL INCLUSION: APPROACHES, CHALLENGES AND IMPACTS ON PEDAGOGICAL PRACTICE

https://doi.org/10.56238/levv16n44-008

Submission date: 12/07/2024 **Publication date: 01/07/2025**

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ABSTRACT

This article presents a systematic review of the literature on continuing education for teachers for the inclusive use of digital technologies in the educational context. The incorporation of these technologies has the potential to transform pedagogical practices, but their effective application depends directly on teacher training. The study investigated successful practices, recurring challenges, and gaps in continuing education programs, based on national and international publications from the last ten years. The methodology followed the principles of Kitchenham (2004) and Gough, Oliver, and Thomas (2017), including the definition of inclusion and exclusion criteria, search in renowned databases,

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analysis, and synthesis of the data collected. The results reveal that effective programs combine the development of technical skills with a contextualized pedagogical approach, promoting critical reflection and adaptation of digital tools to the specificities of classrooms. However, challenges persist, such as lack of resources, resistance to technological innovations, and the absence of adequate institutional support. It was also found that approaches such as the TPACK (Technological Pedagogical Content Knowledge) model offer promising paths for effective integration between technology, pedagogy, and content. This study reinforces the need for continued investment in public policies and training programs that ensure equitable digital inclusion, contributing to more accessible and innovative education.

Keywords: Continuing Education. Digital Inclusion. Educational Technologies. Pedagogical Practices. TPACK Model.

INTRODUCTION

The incorporation of digital technologies into education has led to substantial changes in pedagogical practices, expanding the possibilities for teaching and learning in different contexts. However, for these technologies to be effectively applied inclusively, teachers must be prepared not only in the technical use of the tools but also in their pedagogical application. Continuing education thus emerges as a central element to ensure that educators develop technical, didactic, and socio-emotional skills, allowing them to integrate digital resources in an equitable and accessible manner for all students. Moran (2017) emphasizes that continuing education for teachers is essential for technology to be used in a critical and transformative manner, preventing it from becoming just an additional resource devoid of pedagogical intent. In this sense, the integration of technologies must be guided by reflective practices, aligned with the specificities of educational contexts. Kenski (2012) complements this perspective by stating that teacher training needs to go beyond the acquisition of technical skills, also encompassing the understanding of the sociocultural and economic contexts in which technologies will be applied, promoting more inclusive and equitable education.

At the international level, UNESCO (2019) highlights that teacher training is a fundamental pillar for digital inclusion in schools. According to the organization's report, continuing education is essential for teachers to be able to keep up with technological innovations, ensuring that all students, especially those in vulnerable situations, have equitable access to digital education. Similarly, Darling-Hammond et al. (2017) argue that training should be continuous, reflective, and aligned with the real demands of classrooms, enabling teachers to develop an in-depth understanding of digital technologies and their pedagogical implications.

In the Brazilian context, Almeida (2001) emphasizes that continuing education programs need to consider the structural inequalities present in the educational system. According to the author, training must be aligned with the guidelines for social and digital inclusion provided by the National Common Curricular Base (BNCC), with a focus on democratizing access to technologies and promoting inclusive pedagogical practices.

In this sense, this article aims to conduct a systematic review of the literature on continuing teacher training for the inclusive use of digital technologies. The aim is to identify successful practices, recurring challenges, and research gaps, to offer a critical and comprehensive analysis of training initiatives that promote digital inclusion in the school environment. Based on the review of national and international studies, the aim is to contribute to the understanding of best practices and the conditions necessary for the

success of these programs, collaborating in the construction of a more equitable and technologically integrated education.

METHODOLOGY

The research is characterized as a systematic review of the literature, based on the methodological principles established by Kitchenham (2004) and adapted to the educational context by Gough, Oliver, and Thomas (2017). The study followed rigorous steps to ensure the validity and reliability of the data obtained.

1. Definition of the research question: The guiding question of the study was: “What are the practices, challenges, and impacts of continuing teacher training for the inclusive use of digital technologies in the school environment?”.

2. Inclusion and exclusion criteria: Articles published in the last ten years (2013-2023) and available in renowned scientific databases such as Scopus, Web of Science, and SciELO, among others, were included. The studies should directly address continuing teacher training and its relationship with the inclusive use of digital technologies. Opinion articles, non-empirical essays, and duplicates were excluded.

3. Search procedures: The search was carried out using previously defined keywords, such as “continuing teacher training”, “digital inclusion”, “educational technologies” and “inclusive pedagogical practices”, combined by Boolean operators (AND, OR). The search also included terminological variations in English and Spanish. 4. Selection and analysis of studies: The titles and abstracts of the identified articles were analyzed to ensure their relevance.

5. Data synthesis: The results were organized into thematic categories, allowing the identification of patterns, gaps, and good practices in continuing education programs for digital inclusion.

This methodology allowed an in-depth and critical analysis of the selected scientific publications, offering solid support for the discussion of the results and for the formulation of practical recommendations for public policies and teacher training programs.

THEORETICAL FRAMEWORK

Continuing teacher training for the inclusive use of digital technologies is a field of study that combines pedagogical theories, educational inclusion, and technological integration. The need to train teachers so that they can use technologies effectively and inclusively is widely discussed in the literature, with authors highlighting the importance of professional development that goes beyond the simple acquisition of technical skills, also

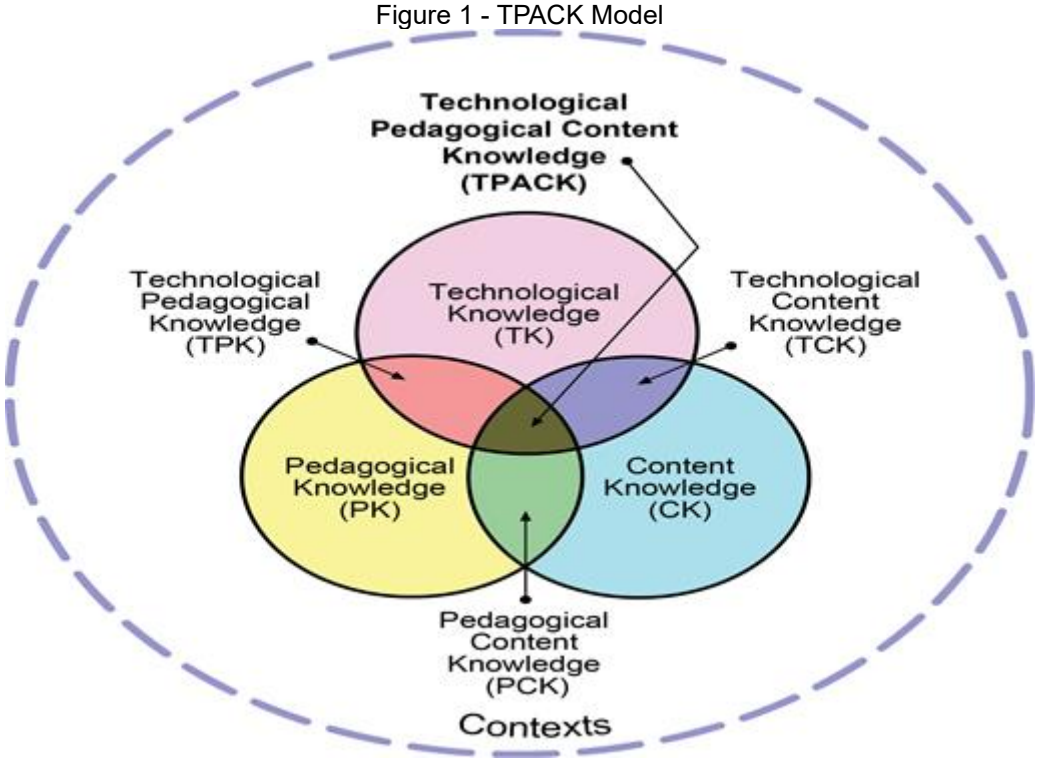
encompassing the mastery of pedagogical strategies adapted to different educational contexts.

According to Freire (1996, p. 47), “critical educational practice requires that the teacher become a subject of new learning, a permanent educator-learner”. This principle applies directly to continuing training focused on the use of digital technologies since educators need to be continually updated and reflective about the best ways to integrate these resources into their pedagogical practices, especially in inclusive contexts.

For Kenski (2012, p. 58), teacher training should be “a reflective and critical practice that considers not only technical skills but also the social and cultural contexts in which technologies will be applied”. Almeida (2017) complements this view by arguing that digital inclusion should be seen as an integral part of educational inclusion. He highlights the need for teacher preparation that allows the use of technologies as empowerment tools for all students, regardless of their social, economic, or cognitive conditions.

In the international scenario, Koehler and Mishra (2009) introduce the concept of Technological Pedagogical Content Knowledge (TPACK), which refers to the intersection of content knowledge, pedagogy, and technology that teachers need to master to effectively integrate digital technologies into their educational practices. They argue that it is not enough for teachers to know how to use technologies; they need to understand how these tools can be applied pedagogically to promote learning inclusively. The authors describe TPACK as a complex interaction between three bodies of knowledge: content, pedagogy, and technology. They explain that the interaction of these bodies of knowledge, both theoretically and in practice, generates the types of flexible knowledge needed to successfully integrate the use of technology in teaching.

Figure 1 - TPACK Model



Source: https://tpack.org/tpack-image/.Darling-

Hammond *et al.* (2017) emphasize that continuing education should be contextualized and focused on pedagogical practice, allowing teachers to develop skills that are directly applicable to their classrooms. They emphasize that effective training programs are those that provide opportunities for practical and collaborative learning, in which teachers can experiment with new technologies and reflect on their experiences in a supportive environment.

The digital inclusion perspective is reinforced by Selwyn (2011), who suggests that the digitalization of education should be accompanied by a strong emphasis on equity, ensuring that all technologies implemented in schools are accessible and relevant to all students. This implies that continuing education for teachers should not only train them to use digital tools but also prepare them to face the challenges associated with digital inclusion, such as the lack of access to technological resources by low-income students.

Finally, the BNCC establishes guidelines that reinforce the importance of digital inclusion and ongoing teacher training, highlighting that educators must be prepared to use digital information and communication technologies in a critical, meaningful, reflective, and ethical manner in the educational context. The BNCC emphasizes the need for training that considers the diversity of students and the inclusion of all in the teaching-learning process, which implies an ongoing commitment to teacher training focused on inclusive and technological pedagogical practices (Brasil, 2017). This theoretical framework highlights the complexity and interrelationship between ongoing training, educational inclusion, and

technological integration, showing that training teachers for the inclusive use of digital technologies is a multifaceted process that requires a holistic and contextualized approach. The literature points to the need for training programs that not only develop technical skills but also promote a deep understanding of pedagogical contexts and student needs, ensuring that everyone can fully benefit from the opportunities offered by digital technologies.

RESULTS AND DISCUSSION

The results of the review indicate that continuing education for teachers in the inclusive use of digital technologies varies significantly in terms of approach, duration, and content. The most effective programs are those that offer a balance between the development of technical skills and the pedagogical application of technologies in inclusive contexts. In addition, the literature highlights the importance of institutional support, such as the provision of technological resources and the creation of policies that encourage continuing education focused on digital inclusion.

Challenges include the lack of time and resources for continuing education, teachers' resistance to adopting new technologies, and the need to customize training programs to meet the specific needs of each educational context. The research also identifies significant gaps, such as the scarcity of longitudinal studies that assess the impact of continuing education on teaching practice in the long term.

EFFECTIVE APPROACHES TO CONTINUING EDUCATION

Education programs that adopt an integrative approach, as suggested by Koehler and Mishra (2009) with the TPACK model, have proven particularly effective. This model highlights the importance of teachers developing knowledge that not only encompasses technology but also how it can be applied pedagogically to enrich the content and meet the diverse needs of students. Reviewed studies indicate that teachers who participate in TPACK-based programs tend to be more effective in implementing inclusive pedagogical practices, as they can adapt technologies to the different realities of their classrooms (Koehler; Mishra, 2009).

In Brazil, the continuing education approach suggested by Kenski (2012) reinforces the need to consider the social and cultural contexts in which technologies will be applied. She highlights that, in order to achieve digital inclusion, it is necessary for training programs to train teachers not only in the technical use of tools but also in understanding how these

technologies can be used to promote the inclusion and engagement of all students, especially those in vulnerable conditions.

CHALLENGES FACED BY TRAINING PROGRAMS

The challenges faced by continuing education programs are multiple. The reviewed literature indicates that many teachers still face barriers such as lack of time, inadequate resources, and resistance to change (Darling-Hammond et al., 2017). This resistance can be attributed to the lack of institutional support and insufficient infrastructure. Technological, as highlighted by Selwyn (2011), states that the successful adoption of digital technologies in schools depends not only on teacher training but also on an environment that supports and encourages such adoption. Resistance to technological change among teachers is often related to the lack of continuous and personalized support, as suggested by Fullan (2007), who highlights the importance of institutional support for educational transformation. The lack of adequate resources has also been identified as a significant barrier, limiting teachers' ability to apply what they have learned during training programs in their daily pedagogical practices.

IMPACTS OF CONTINUING EDUCATION ON PEDAGOGICAL PRACTICE

When the challenges are overcome, the impacts of continuing education on pedagogical practice can be substantial. Moran (2017) argues that continuing education, when well structured, can transform teaching practice, promoting greater inclusion and student engagement. The studies reviewed indicate that teachers who participate in ongoing training that integrates the development of inclusive technological and pedagogical skills report greater confidence in using digital technologies, which translates into more dynamic and accessible pedagogical practices for all students (Almeida, 2001). Furthermore, the results suggest that ongoing training contributes to the creation of a more equitable learning environment, where technologies are used to adapt teaching to the individual needs of students, as advocated by Moran (2017) and Kenski (2012). This is particularly relevant in the context of inclusion of students with special needs, where assistive technologies can play a crucial role in promoting equal educational opportunities.

GAPS IN THE LITERATURE AND FUTURE DIRECTIONS

Despite the advances identified, the review also revealed significant gaps in the literature. There is a scarcity of longitudinal studies that assess the impact of ongoing training on teaching practice in the long term. As pointed out by Garet et al. (2001), ongoing

monitoring is needed to understand the lasting effects of continuing education on teaching effectiveness. Future studies should focus on investigating how continuing education programs can be sustained over time and how they impact student performance, especially in contexts of high social and digital vulnerability.

In addition, the research highlights the need for greater attention to the personalization of training programs. Standardized programs may not meet the specific needs of different educational contexts, which suggests the importance of a more flexible and adaptable approach, as advocated by Darling-Hammond et al. (2017). The inclusion of practical components, such as workshops and communities of practice, is also recommended to facilitate the application of acquired knowledge and promote the exchange of experiences among teachers.

CONCLUSION

The systematic review of the literature reveals that continuing education for teachers in the inclusive use of digital technologies is a central element for the transformation of pedagogical practice in the digital age. The results of this literature review show that successful training programs are those that balance the development of technical skills with pedagogical application in inclusive contexts. The integrative approach, as exemplified by the TPACK model, has proven effective in enabling teachers to understand and apply digital technologies in ways that enrich teaching and meet the diverse needs of their students.

However, the challenges faced by continuing education programs are significant. Lack of time, adequate resources, and insufficient institutional support are barriers that still limit the effectiveness of these initiatives. Therefore, it is essential to have a robust support environment that goes beyond simply training teachers. This support must also include the provision of adequate infrastructure and ongoing monitoring to ensure that technologies are effectively integrated into the educational process. Only in this way will it be possible to promote a significant transformation in the use of digital technologies in the classroom.

Therefore, the positive impacts of continuing education are clear: better-prepared teachers feel more confident and can implement more inclusive and dynamic pedagogical practices, which contributes to the creation of more equitable learning environments. However, the reviewed literature also reveals gaps, especially in the long-term evaluation of the effects of these programs and the need to customize training curricula to meet the specific needs of different educational contexts.

In view of this, it is this It is essential that educational policies and higher education institutions invest in continuing education programs that are flexible, contextualized, and

sustainable. Furthermore, future studies must focus on developing strategies that ensure the continuity and customization of these programs, with a special focus on contexts of high social and digital vulnerability.

It is concluded that, for digital inclusion to become a reality in schools, continuing education for teachers must be a priority on educational agendas, being seen as a continuous process of improvement that goes beyond the mastery of technological tools, incorporating a critical and inclusive vision of education in the digital age. In this way, it will be possible to advance in the construction of an educational system that uses technologies as allies in promoting truly inclusive and transformative learning.

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