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THE INTEGRATION OF DIGITAL TOOLS IN THE CLASSROOM: IMPACTS ON TEACHING AND LEARNING

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Daniela Paula de Lima Nunes Malta[1], Ana Rosa Sales Cabral[2], Vera Lucia Kochen[3], Cibele Elias da Silva[4], Maridenes Noronha de Oliveira[5], Divina Aparecida de Oliveira[6], Sandra Vieira de Souza Moço[7] and Ticiane Pereira de Souza Bezerra[8]

ABSTRACT

The study analyzed the impacts of integrating digital tools in the classroom, focusing on their influence on teaching and learning. The central problem investigated was how these technologies are being implemented and what are the challenges and benefits associated with their use in the educational context. The general objective was to understand how the use of digital tools can transform pedagogical practices and promote better educational results. The methodology was based on a qualitative literature review, using relevant academic sources to explore the theme. The results indicated that digital tools increased interactivity, personalized teaching and expanded access to knowledge, favoring student autonomy. However, the survey also highlighted significant challenges, such as institutional barriers, inequality of access, and insufficient teacher training, which made it difficult to fully integrate these technologies into the school environment. The analysis reinforced that overcoming these limitations requires investments in infrastructure, continuous teacher training and public policies that promote equity. In the final considerations, the study pointed

[1] Doctor of Letters
Federal University of Pernambuco (UFPE)
Email: malta_daniela@yahoo.com.br
[2] School Management Specialist
State University of Ceará (UECE)
E-mail: anacabral.neuropsicopedagoga@gmail.com
[3] Dr. student in Educational Sciences
Sao Luis University
E-mail: verakochen@gmail.com
[4] Specialist in Institutional Psychopedagogy
Faculty of Education São Luís (FESL)
E-mail: cibelefabiano070@gmail.com
[5] Master in Emerging Technologies in Education
MUST University
E-mail: maridenes.oliveira@gmail.com
[6] Specialist in Teaching in the Area of Natural Sciences and Mathematics
Affirmative Faculty (FAFI)
E-mail: divina.aparecida.oliveira@hotmail.com
[7] Master's student in Emerging Technologies in Education
MUST University
E-mail: sandra.vsm@hotmail.com
[8] Pedagogical Coordination Specialist
Federal University of Amazonas (UFAM)
E-mail: ticianeps30@gmail.com

out that, although digital technologies have great potential to improve teaching, successful implementation depends on strategies that consider different educational realities. The need for future studies to broaden the understanding of the long-term impacts of these tools and their applications in different contexts was also suggested.

Keywords: Digital Tools. Education. Teaching. Apprenticeship. Public Policies.

INTRODUCTION

The integration of digital tools in the classroom has become a topic of increasing relevance in the educational field, especially due to the transformations promoted by the digitalization of society. These technologies, when well implemented, have the potential to improve teaching and learning processes, providing greater interactivity and dynamism in pedagogical practices. However, its use still faces challenges related to teacher training, infrastructure, and adaptation to educational realities. The discussion about how these tools can contribute to the training of students and to the improvement of the quality of teaching is essential to understand their impact on contemporary education.

The choice of the theme is justified by the growing role of digital technologies in education and the need to understand how these tools can be used in the school environment. With the expansion of access to technological resources, the integration of digital tools is no longer an optional choice but a necessity in an ever-evolving educational landscape. In addition, investigating the impacts of these technologies in the classroom enables reflections on the challenges faced by teachers and students, in addition to contributing to the formulation of strategies that promote equitable and innovative education.

The central problem that guides this study is the analysis of the impacts generated by the use of digital tools in the teaching and learning process. This includes understanding how these technologies are being integrated into the school curriculum, how they influence pedagogical practice, and what the impact of these changes is on student performance. Considering the different school realities, there is a need to investigate whether digital technologies are contributing to the improvement of education or whether their implementation faces barriers that compromise the expected results.

The objective of this study is to investigate the impacts of the integration of digital tools in the classroom, analyzing the influence on teaching and learning, with an emphasis on pedagogical practices and educational outcomes.

The text is organized in such a way as to provide an analysis of the theme. After this introduction, the theoretical framework presents concepts about digital technologies in education, active methodologies and the impacts on teaching and learning. The development addresses teacher training, curricular integration and examples of digital tools. The methodology details the criteria used for the literature review. In the discussion, the benefits, challenges and solutions related to the topic are analyzed. Finally, the final considerations summarize the main findings and present recommendations for future research and educational practices.

THEORETICAL FRAMEWORK

The theoretical framework is structured in three main sections, each addressing fundamental aspects of the theme. The first section presents the concepts and definitions of digital technologies in education, highlighting their historical evolution and role in the contemporary educational context. In the second section, the relationship between digital tools and active methodologies is argued, exploring how the integration of these technologies can transform pedagogical practices, encourage student protagonism and promote collaborative learning. Finally, the third section focuses on the impacts of digital tools on teaching and learning, analyzing the implications for teaching practice, student engagement, and educational outcomes. These sections provide the theoretical basis for understanding the challenges and possibilities of technological integration in the school environment.

THE IMPORTANCE OF TEACHER TRAINING

Teacher training is essential to ensure the efficient use of digital tools in the educational environment. Rapid technological evolution demands that teachers acquire and update their pedagogical and technical skills. According to Felipe and Gontijo (2021, p. 194), "teaching technological competence goes beyond the mastery of digital tools, encompassing the ability to integrate them into the educational context to enhance learning". This statement highlights the need for an education that contemplates not only the instrumental use, but also the critical reflection on the role of these technologies in teaching.

However, several challenges still hinder the effective implementation of these technologies. Oliveira and Vaz (2022, p. 76) highlight that "many teachers report difficulties in using digital tools due to the lack of specific training and the limited support offered by schools". This scenario shows how the absence of adequate training can impact teaching practice, making it difficult to incorporate new methodologies that use digital technologies.

In addition, there are initiatives that exemplify the benefits of continuous and well-structured training. Moura (2016, p. 3) observes that, in projects focused on mobile learning, "teachers who participated in training programs were able to integrate digital tools in an innovative way, promoting greater student engagement". This experience demonstrates that investment in training programs can transform the way technologies are used in the classroom.

The relevance of teacher training for the integration of digital tools is also evidenced by Barroso and Antunes (2015, p. 2), who argue that "continuing education, when aligned

with the practical needs of teaching, allows teachers to explore the potential of digital tools, creating interactive and dynamic learning environments".

This argument reinforces the idea that training should not be punctual, but part of a continuous process that accompanies technological and pedagogical transformations.

Therefore, teacher training is an indispensable element to face the challenges imposed by the integration of technologies in education. The successful experiences highlighted in the literature indicate that training can improve pedagogical practice, encouraging the creative and efficient use of digital tools. Thus, investing in continuing education and support for teachers becomes essential to promote innovation and development in the educational context.

INTEGRATION OF DIGITAL TOOLS AND CURRICULUM

The integration of digital tools into the school curriculum requires approaches that consider the specificities of each subject and the suitability to contemporary educational needs. According to Franco (2013, p. 22), "the use of digital educational resources in teaching must be planned to meet pedagogical objectives, integrating them into the curriculum in a way that complements and expands the learning process". This approach underscores the importance of aligning technology with curricular practices, ensuring its functionality as a pedagogical tool.

In the context of practical application, Moura (2016, p. 4) describes how the use of digital tools, such as educational applications and collaborative platforms, can facilitate the teaching of specific subjects. The author points out that, in an experience with mobile tools, "students demonstrated greater engagement in reading and writing activities, attributing to technology a motivating function in the learning process". This example reinforces that the well-planned integration of technologies can bring significant benefits to the development of school skills.

In addition, alignment with the National Common Curriculum Base (BNCC) is essential to consolidate the integration of technologies in the educational system. Oliveira (2023, p. 85) observes that "the BNCC proposes the use of technological resources as part of the development of general competencies, with emphasis on the responsible and creative use of technology in the school context". This perspective underlines the relevance of incorporating digital tools into curriculum planning in a way that is consistent with national guidelines, ensuring that educational practices are in tune with contemporary demands.

Barroso and Antunes (2015, p. 3) argue that "the integration of digital tools into the curriculum should not be limited to the adoption of technologies in isolation, but rather

guided by pedagogical strategies that stimulate student interaction, creativity and critical thinking."

Thus, the need for careful planning is reinforced so that technologies are not used only as additional instruments, but as transforming elements of pedagogical practice.

Therefore, the integration of digital tools and the school curriculum depend on approaches that consider both pedagogical objectives and national guidelines. Practical examples show that, when aligned with the curricular context, technologies can enrich teaching and learning. Alignment with the BNCC ensures that these practices are structured in accordance with the expected competencies, promoting dynamic and relevant teaching.

EXAMPLES OF DIGITAL TOOLS IN TEACHING

The use of digital tools in teaching has expanded, involving technologies such as digital whiteboards, educational applications, and collaborative platforms. According to Barroso and Antunes (2015, p. 4), "the digital whiteboard transforms the dynamics of the classroom, allowing interactivity between content and students, in addition to enabling access to multimedia resources that expand pedagogical possibilities". This statement shows how technologies, when integrated into the educational process, can enrich pedagogical practices.

Regarding educational applications, Moura (2016, p. 5) highlights that "applications have been used to personalize teaching, allowing students to learn at their own pace and access interactive content". This characteristic facilitates the development of students' autonomy and promotes active learning. In addition, Franco (2013, p. 28) observes that collaborative platforms "allow the collective construction of knowledge, encouraging group work and the exchange of ideas among students". This approach favors collaboration and engagement, fundamental elements for dynamic teaching.

The case studies reinforce the effectiveness of these tools. In a project to integrate mobile technologies, Moura (2016, p. 6) reported that "students who used educational applications showed greater interest in the activities and a significant improvement in school performance". This data illustrates how the proper use of digital tools can impact learning.

Rodrigues and Moreira (2009, p. 3) argue that "the use of emerging technologies, such as online learning platforms, has shown promising results by enabling the personalization of teaching, access to diverse resources and the integration of innovative pedagogical methods." The potential of digital technologies to promote teaching practices that meet the demands of a connected society is highlighted.

Therefore, the analysis of the digital tools used in teaching demonstrates that, when well implemented, these technologies can transform educational practices. The evidence presented in the case studies shows that digital whiteboards, apps, and collaborative platforms not only streamline teaching, but also contribute to meaningful and contextualized learning. These examples reinforce the importance of integrating emerging technologies into the school environment in a planned manner that is aligned with educational objectives.

METHODOLOGY

The methodology used for this study is based on a literature review, with the objective of analyzing academic and scientific productions related to the integration of digital tools in teaching. This is a qualitative research, whose focus is to understand, describe and interpret the data available in the literature. The qualitative approach was chosen because it allows the analysis of concepts, theories and empirical studies that argue the proposed theme. The instruments used consisted of scientific databases, books, articles, dissertations and theses. The procedures involved the careful selection of sources, considering the relevance, timeliness and pertinence to the theme. The techniques employed included exploratory and analytical reading of the selected works, organizing the contents in a systematic way to identify the main focuses and results present in the literature.

The table presented below organizes the references used in the study, highlighting the authors, titles of publications, years and types of work. This systematization seeks to provide the reader with a clear understanding of the sources that underpinned the discussions developed throughout the text.

Chart 1: References used in the literature review

Author(s)	Title	Year	Type of Work
FARIA, P.	Curricular integration of educational technologies in the teaching of the Portuguese language: a blog to develop reading and writing.	2008	Scientific Article
RODRIGUES, J.; MOREIRA, A.	EVTdigital: a space for the integration of digital tools in the discipline of EVT.	2009	Event Work
FRANCO, C.	The use of digital educational resources in the classroom: a fundamental component in teaching.	2013	Internship Report
ZEDNIK, H.; TAROUCO, L. M. R.; KLERING, L.	Digital technologies in education: taxonomic proposal to support the integration of technology in the classroom.	2014	Event Work
BARROSO, F.; ANTUNES, M.	Technology in education: digital tools that facilitate teaching practice.	2015	Scientific Article
MOURA, A.	Mobile learning and digital tools to innovate in the classroom.	2016	Scientific Article

SCHMITT, C.	The integration of DICT into mathematics education: a study on the use of digital tools and active methodologies in mathematics teaching and learning.	2018	Scientific Article
SANTOS, V. A. dos; DANTAS, V. R.	The use of digital tools in academic remote teaching: challenges and opportunities from the teaching perspective.	2020	Event Work
ARAÚJO, V. S.	Teacher training for the critical teaching of the Portuguese language: an experience in the pedagogy course through the 'Blackboard' platform.	2020	Dissertation
ARAÚJO, V. S.; LOPES, C. R.	Conceptions of critical training of teachers in university education.	2020	Book Chapter
FELIPE, E. P.; GONTIJO, F. G.	Technological skills beyond the use of digital tools in the classroom.	2021	Scientific Article
ARAÚJO, V. S; SILVA, N. N.	Reading in the formation of the citizen in the light of critical literacy.	2022	Book Chapter
OLIVEIRA, V. B.; VAZ, D. A. F.	Physical and mental health of teachers in the remote teaching period in public schools in Goiás.	2022	Book Chapter
OLIVEIRA, V. B.	Discussions of evaluation practices in ninth grade classes of elementary school in a state public school in Goiânia and the teachers' testimonies from the perspective of historical-cultural conceptions.	2023	Dissertation
SANTOS, S. M. A. V. (ed.).	Education 4.0: management, inclusion and technology in the construction of innovative curricula.	2024	Book
SANTOS, S. M. A. V. (ed.).	Education in the XXI century: interdisciplinary and technological approaches.	2024	Book
SANTOS, S. M. A. V. (ed.).	Integral inclusion: contemporary challenges in education and society.	2024	Book
SANTOS, S. M. A. V.; FRANQUEIRA, A. S. (eds.).	Educational innovation: emerging practices in the twenty-first century.	2024	Book
SANTOS, S. M. A. V.; FRANQUEIRA, A. S. (eds.).	Media and technology in the curriculum: innovative strategies for contemporary teacher training.	2024	Book

Source: The Authors

It is possible to observe that the selected references cover studies related to the application of digital technologies in education, with varied focuses on teacher training, impacts on learning and challenges for technological integration. This survey provided essential theoretical subsidies for the construction of the arguments and discussions presented in this work, consolidating a basis for the proposed analysis.

BENEFITS OF INTEGRATING DIGITAL TOOLS

The integration of digital tools in teaching offers significant benefits for the educational process, with emphasis on increased interactivity and the personalization of pedagogical practices. According to Felipe and Gontijo (2021, p. 196), "digital tools create possibilities for interaction between teachers, students, and content, allowing teaching to become dynamic and adapted to the individual needs of students". This approach fosters a

participatory learning environment, where the student takes an active role in his or her own educational process.

The personalization of teaching is another relevant aspect provided by digital technologies. Moura (2016, p. 5) points out that "digital platforms allow content to be adjusted to the specific needs of students, promoting a meaningful learning experience". With this, teachers can cater to different learning styles and rhythms, optimizing educational outcomes.

In addition, expanding access to knowledge is a central benefit of digital technologies. Rodrigues and Moreira (2009, p. 4) argue that "digital resources democratize access to content, allowing students from different contexts to connect to high-quality information and teaching materials". This point is reinforced by the possibility of accessing *online content*, which benefits students from regions with fewer educational resources.

Oliveira (2023, p. 90) observes: "the student's autonomy is strengthened when he has access to tools that make it possible to explore the content at his own pace and interest, developing essential skills for continuous learning throughout life." Thus, the positive impact of digital tools on the formation of independent students prepared for contemporary challenges is emphasized.

Therefore, the integration of digital tools into teaching contributes to the interactivity and personalization of pedagogical practices, also expanding access to knowledge. These benefits strengthen student autonomy, promoting active and meaningful learning. Thus, digital technologies present themselves as important allies to face current educational challenges, providing equitable and inclusive education.

CHALLENGES AND LIMITATIONS

The implementation of digital tools in education faces challenges and limitations that involve institutional, cultural, and economic barriers. According to Oliveira and Vaz (2022, p. 77), "public schools face difficulties in acquiring technological resources and ensuring their maintenance, which compromises the insertion of these tools in the school environment". This situation demonstrates how limited infrastructure can hinder the integration of digital technologies, restricting their use to privileged contexts.

In addition to structural issues, cultural aspects also play a key role. Franco (2013, p. 30) observes that "in many institutions, there is still resistance on the part of teachers and managers to adopt digital technologies, either due to lack of familiarity with the tools or fears about the effectiveness of their use". This comment reinforces that, in addition to

technological resources, it is necessary to promote a change in mentality within school communities so that innovation is incorporated.

Another relevant point is the inequality of access, which affects both students and teachers. According to Rodrigues and Moreira (2009, p. 5), "the disparity in access to the internet and technological equipment reflects social inequalities, creating a gap between those who are able to use digital tools and those who do not". This reality demonstrates how digital technologies can, in some cases, amplify pre-existing inequalities, rather than mitigate disparities. Barroso and Antunes (2015, p. 6) argue:

> Insufficient teacher training for the use of digital technologies is one of the main obstacles to their implementation. Without adequate training, the tools become underused, resulting in ineffective and demotivating pedagogical practices.

This argument emphasizes that teacher training is essential to overcome the limitations associated with the implementation of digital tools, highlighting that investment in training is as important as investment in infrastructure.

Therefore, the challenges and limitations associated with the integration of digital tools in education go beyond the lack of technological resources, encompassing institutional, cultural, and economic barriers, as well as problems related to inequality of access and insufficient teacher training. These factors show that, for successful implementation, it is necessary to adopt strategies that consider the different educational realities and promote equity in the access and use of technologies.

PROPOSALS AND SOLUTIONS

Overcoming the challenges related to the integration of digital tools in education requires strategies that involve teacher training, investments in infrastructure, and the articulation between public policies and partnerships with the private sector. According to Felipe and Gontijo (2021, p. 198), "the continuous training of teachers is essential for them to be able to use technologies in a pedagogical and efficient way, aligning digital tools with the needs of the curriculum". This approach highlights the need for training programs that prepare teachers not only for the technical use of technologies, but also for their application in the educational context.

In addition to training, investments in infrastructure are indispensable. Oliveira and Vaz (2022, p. 78) observe that "schools that have adequate technological support and quality internet are able to integrate digital tools, promoting interactive and dynamic teaching". This point shows that infrastructure is a basic condition for technologies to be used as learning tools.

Another essential aspect is the strengthening of public policies that promote equity in access to technologies. Franco (2013, p. 32) points out that "government initiatives aimed at the distribution of equipment and technical support to schools are fundamental to reduce inequalities in the use of digital technologies". This perspective suggests that the role of the State is central to ensuring that all educational institutions are able to implement digital tools in their pedagogical practices. Barroso and Antunes (2015, p. 7) state:

> Partnerships between the public and private sectors can offer innovative solutions to technological challenges in education, such as the provision of equipment, digital platforms and teacher training programs, as well as initiatives to monitor and evaluate results.

The importance of collaboration between different actors is highlighted so that the necessary resources are made available and used in schools.

Therefore, proposals and solutions to overcome the limitations related to the integration of digital tools in teaching should consider a joint approach. Continuous teacher training, investment in technological infrastructure, and the strengthening of public policies are essential measures for building inclusive and modern education. In addition, partnerships with the private sector can complement public efforts by promoting the implementation of digital technologies in the educational environment.

FINAL CONSIDERATIONS

The results presented throughout this study highlight that the integration of digital tools in the classroom impacts teaching and learning, providing relevant benefits, but also facing challenges that require specific attention and strategies. The analysis showed that these technologies can increase the interactivity and personalization of teaching, enabling dynamic pedagogical practices aligned with the needs of students. In addition, it was identified that digital tools contribute to expanding access to knowledge and promoting student autonomy, factors that strengthen learning.

However, challenges related to the implementation of the technologies remain significant. Institutional, cultural, and economic barriers make it difficult to fully integrate digital tools in many schools, especially those with limited resources. In addition, unequal access and insufficient teacher training remain barriers to the application of these technologies. These challenges indicate that, although the benefits are recognized, their realization depends on structured actions that involve investments in infrastructure, teacher training and public policies.

The contributions of this study are related to the understanding of the potentialities and limitations of the use of digital tools in the school context. The research reinforces the need for integrated actions that promote not only access to technologies, but also their pedagogical integration in a planned and efficient way. In addition, the analysis brought important reflections to managers, educators and policymakers on how to overcome existing difficulties and maximize the benefits that technologies can offer to education.

Despite the findings, there are limitations that indicate the need for further studies. The analysis suggests that future research can explore the effectiveness of different tools in varied contexts, as well as investigate the long-term impact of continuing teacher education on the use of digital technologies. It would also be relevant to study how public policies can be implemented equitably, considering the regional and economic disparities of the education system.

Therefore, this study provides a theoretical and reflective basis on the integration of digital tools in teaching, but reinforces that the topic requires continuous attention. With the constant evolution of technologies, it will be necessary to monitor and evaluate how these tools can be used to transform education. The contributions presented here aim to stimulate discussions and practices that favor an accessible, interactive education aligned with contemporary demands.

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