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Digital Technologies and the Construction of Meaningful Learning

Tecnologias digitais e a construção de aprendizagens significativas
Tecnologías digitales y la construcción de aprendizajes significativos

Adaberon Martins Moreira
Antônio Anderson Lopes Barreto
César Pessoa de Aguiar
Joheldes Sousa da Silva
Jonh Silas da Silva Nascimento
Thiago Rômulo Lima Lucas

Abstract:
Technologies are part of the progress of humanity; they have ceased to be mere complementary resources and have become a central element in the structuring of teaching and learning. The justification lies in the importance of education being aligned with technology applied to a new way for society to project itself in terms of communication, research, study, and information. Digital technologies in education have significantly contributed to access to knowledge, enabling diversified and personalized pedagogical practices. The question that was presented in light of this issue was the following: Did digital technology in education come to contribute to the critical and reflective development of knowledge? The general objective was to bring to light the importance of digital technologies in education.

Keywords:
Education. Digital technologies.

Resumo:
As tecnologias fazem parte do progresso da humanidade; elas deixaram de ser meros recursos complementares e passaram a se tornar elemento central na estruturação do ensino e da aprendizagem. A justificativa se apresenta pela importância de a educação estar alinhada à tecnologia aplicada a uma nova forma da sociedade se projetar diante da comunicação, da pesquisa, do estudo e da informação. As tecnologias digitais na educação contribuíram de forma expressiva para o acesso ao conhecimento, viabilizando práticas pedagógicas diversificadas e personalizadas. A pergunta que foi apresentada diante desta questão foi a seguinte: A tecnologia digital na educação veio para contribuir para o desenvolvimento crítico e reflexivo do saber? O objetivo geral foi trazer à luz da discussão a importância das tecnologias digitais na educação.

Palavras-chave:
Educação. Tecnologias digitais.

Resumen:
Las tecnologías forman parte del progreso de la humanidad; dejaron de ser meros recursos complementarios y pasaron a convertirse en un elemento central en la estructuración de la enseñanza y del aprendizaje. La justificación radica en la importancia de que la educación esté alineada con la tecnología aplicada a una nueva forma de proyectarse la sociedad ante la comunicación, la investigación, el estudio y la información. Las tecnologías digitales en la educación contribuyeron de manera significativa al acceso al conocimiento, haciendo posibles prácticas pedagógicas diversificadas y personalizadas. La pregunta planteada ante esta cuestión fue la siguiente: ¿La tecnología digital en la educación vino a contribuir al desarrollo crítico y reflexivo del saber? El objetivo general fue sacar a la luz de la discusión la importancia de las tecnologías digitales en la educación.

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Palabras clave:
Educación. Tecnologías digitales.

1. INTRODUCTION

A priori, it is important to emphasize that addressing education and applied technology is part of fascinating work and, at the same time, leads us to a profound reflection on the new digital era, the new forms of knowledge transmission, communication, and the speed of information. The expansion of digital technologies has contributed to everyone developing a new perspective on this new way of providing education.

On the other hand, the spread of digital technologies has restructured relationships with the new application of knowledge, rapidly shared knowledge, dynamic information, and the production of new principles and values in society. Thus, education, as the main axis of formation, has not remained apathetic toward these transformations; on the contrary, it has begun to embrace this new way of working with knowledge, moving from simple support tools to the use of interactive platforms, adaptive resources, and virtual learning environments. These instruments have become part of the routine of educational institutions and have assumed a strategic role in renewing pedagogical practices and in realizing and defending the right to quality, inclusive education.

The justification lies in the importance of education being aligned with technology applied to a new way for society to project itself in communication, research, study, and information.

School is part of a challenging and dynamic cycle involving the application of new pedagogical practices and the development of critical and reflective thinking. Applied technology has given society a new perspective on knowledge and has provided young people with an even more fascinating and rapid resource for research, the desire to acquire increasing amounts of information, and the construction of learning. The question posed in this regard is the following: Has digital technology in education come to contribute to the critical and reflective development of knowledge?

It is important to emphasize that, far from being mere accessories or substitutes for face-to-face teaching, the new ways of working with knowledge and digital technologies represent strategic potential for pedagogical practices, expanding access to the desire to learn, research, and inclusion.

The general objective is to bring to light the importance of digital technologies in education. The specific objectives are: to discuss digital technologies in education. The specific objectives are: to discuss the importance of education and digital technology applied to the construction of knowledge; to address the challenges of technology applied in education; and to discuss technologies applied to inclusion and transformation work.

However, their effective implementation is not limited to the presence of equipment: it involves structural changes, teacher training, and overcoming inequalities. This article analyzes the role of technologies in current education, their benefits, the challenges that still permeate their use, and the prospects for a truly transformative application.

The methodology presented is bibliographic in nature, in which this analysis is methodical, organized, and systematized. Important authors such as Dantas, Santos, Silva (2023); Oliveira et al. (2024); Lima et al. (2022); Val and López-Bueno (2024), and other authors, are part of this theme.

2 EDUCATION AND DIGITAL TECHNOLOGY APPLIED TO THE CONSTRUCTION OF KNOWLEDGE

Educational practice needs to be attuned to the changes and innovations involving the critical and reflective reasoning of teachers and educational managers, as well as a change in students' attitudes toward knowledge. On the other hand, digital technologies make it possible to break with the unidirectional transmission of knowledge. It is necessary to emphasize that, through videos and educational and inclusive games, the content transmitted to students can be addressed in varied ways, thereby benefiting and meeting the diversity of rhythms, styles, and different forms of absorbing knowledge, as well as meeting learning needs. Digital technologies applied in education contribute to access to research materials and experiences that would otherwise be restricted to a few, bringing different realities closer together and encouraging student autonomy in the construction of knowledge in general.

Dantas, Santos, and Silva (2023) support the idea that digital technologies are not merely complementary resources linked to pedagogical planning; they have a broader role in expanding knowledge and participation and are essential to making inclusive education effective. Education must keep pace with transformations and innovations connected to critical and reflective thinking. Managers, pedagogical coordinators, teachers, and educational supervisors must remain alert to this new educational scenario and to contemporary forms of knowledge construction.

The advance of digitization and virtual communications is already part of the contemporary educational landscape. For Ferrari, Souza, and Sodré (2022), assistive technologies and the implementation of accessible digital resources make it possible, to a certain extent, to overcome obstacles to communication and socialization; however, for all this to be established, projects for implementing inclusive pedagogy are necessary.

It is important to note that the new dynamics of knowledge construction involve digital platforms, in which distance education has expanded in an increasingly rapid and inclusive manner. On the other hand, Fundo Lima et al. (2022) point out that the main challenges to introducing technologies into schools include unequal access, insufficient training, and, unfortunately, merely instrumental use without genuine exploration of their transformative potential. It is important to emphasize that this technological universe provides a renewal in the way teaching and learning are understood and practiced.

Educating in today's society is more complex and requires rethinking teaching and the meaningful integration of technologies, consolidating the school as a central space for the critical formation of developing citizens. Education articulates knowledge, values, and critical thinking; human beings transform and are transformed by their environment. The connection between applied technology, communication, and the educational universe requires, above all, continuous education and training for everyone, in an ongoing process of building knowledge and developing skills and competencies.

The Covid-19 pandemic drove transformations, accelerated the use of digital tools, intensified distance education, and redefined educational practices. According to Faria and Vieira (2024), digital information and communication technologies redefine teaching by bringing to light the possibility of multiple presentations of content and learning rhythms. With regard to inclusive education, these tools are even more relevant because they function as assistive technologies, enabling people with visual or motor disabilities or learning disorders to participate fully in school activities.

Even in the face of economic challenges and the lack of access to the internet and other equipment, the rapid spread of technologies required a concerted effort from all spheres of government to transform this scenario into an opportunity with an inclusive character, so that everyone could and can take part and participate equally. Oliveira et al. (2024) state that artificial intelligence and adaptive tools are new resources capable of personalizing teaching, but that they require ethical and planned use in which the principle of equality is upheld.

Information and communication technologies function as extensions of thought and the senses, expanding human capacity. It is important to note that computers and notebooks are, to

a certain extent, relevant and precise tools for the new language of digital knowledge. As systematic and organized pedagogical resources, they allow broad access to content, the use of videos and discussion spaces, bring teachers and students closer together, and strengthen inclusion and the exchange of knowledge. In education, the computer is an increasingly significant tool that supports the construction of teaching and learning in a meaningful way, and it is the teacher's responsibility to introduce students to this technological universe.

In this new scenario, educators and managers face the challenge of renewing the way theoretical and practical knowledge is constructed, assuming the role of learning mediators. Technologies are part of the pedagogical process, expanding research, accelerating access to information, and strengthening inclusion.

2.1 THE CHALLENGES OF TECHNOLOGY APPLIED IN EDUCATION

Education and applied technology are characterized by challenges; therefore, it is important for schools to be attentive to changes and applied technological resources. On the other hand, despite the growth process, barriers that limit the full use of these resources are part of a process under construction. Unfortunately, the digital divide still affects a large number of educational institutions that are not adequately equipped. Thus, without equal access, technology may widen inequality even further instead of reducing it.

Lima et al. (2022) substantiate the importance of the main issues surrounding the effective inclusion of digital technologies in schools and how these technologies often face unequal access, as well as teacher training that, unfortunately, remains insufficient in some institutions.

Another critical point concerns teacher education, since many of these professionals do not receive adequate, continuous, and practical preparation to use these tools. In addition, there are challenges related to digital security.

Education is structured as a constant exchange between teaching and learning, in which transformations and renewals of knowledge result from the collective participation of everyone involved in this process. Cunha (2023) argues that equipping schools is not enough; according to him, the issue is not the absence of equipment, but what truly compromises education is the lack of pedagogical preparation, with unprepared and insecure teachers in classrooms. For him, this is the most delicate problem in the construction of knowledge; this is the true classroom reality that must be restructured through the foundation and qualification of its teachers.

With the major impact of digital technology, which brought a new perspective to education and to the application of active methodologies, these methodologies needed to be discussed and implemented because their contribution has been important to the development of learning and to the process of constructing and expanding knowledge. Marques and Lima (2022) state that active methodologies place the student as the principal agent of learning. The human being is the individual who projects themselves into the world in the face of new discoveries and challenges.

Resources such as educational platforms and virtual forums make it possible to personalize the educational pathway while respecting the pace and particularities of each student. This dynamic strengthens mutual engagement, enables experiences and knowledge to be shared and debated, and promotes more expressive and effective learning.

According to Moran (2000, pp. 245–253), “Educating today is more complex because society is also more complex, as are the necessary competencies. It is extremely important to rethink teaching and the effective inclusion of technology in the educational process (...)”. The era of so-called digital technologies in the educational environment represents an important milestone, but much remains to be done because some barriers still need to be broken.

Unfortunately, unequal access persists, as quality internet service and suitable devices do not reach everyone equally. Technology may end up deepening possible social differences instead of reducing them. Many schools and families still lack basic resources, which prevents some students from participating fully in digital activities.

Next comes the insufficient training of education professionals. Many educators feel unprepared to integrate these tools in a pedagogically meaningful way and limit themselves to reproducing traditional practices on screens. Effective use requires continuous training that combines technical mastery with reflection on how these resources can contribute to learning, especially from an inclusive perspective.

There is also the risk of merely instrumental use, in which technology is viewed as an end in itself rather than as a means of achieving educational objectives. Without consistent planning, digital resources may be applied without criteria, generating distractions or information overload instead of supporting the construction of knowledge.

Issues also arise regarding digital security, principles related to ethical precepts, and the quality of information. Above all, students must be guided to navigate critically, to think in a focused, critical, and reflective manner, and to discern and understand the limits and

responsibilities of the virtual environment. For Murillo-Jiménez et al. (2022), technology makes its proper contribution to inclusion when it is part of a process of planning and organization in which it can be accessible to everyone.

Overcoming these challenges does not mean rejecting technology, but understanding that it depends on integrated public policies, adequate training, and, above all, a change in attitude: technology must always serve a fairer, more inclusive, and more meaningful education for everyone.

Teachers use platform data to identify and meet each student's pedagogical needs. Val and López-Bueno (2024) state that continuous and contextualized teacher training is decisive: professional practice must go beyond the use of equipment in classrooms and their respective laboratories; it is important to understand how technology can objectively contribute to the construction of teaching and thereby meet the diversity of rhythms and needs.

It is important to emphasize that, with access to learning, students begin to share experiences in the construction of knowledge; this is where they begin to expand their awareness. There is no doubt that encouraging students to participate in decisions about their own learning strengthens their sense of responsibility and autonomy, preparing them not only for the development of formal knowledge but mainly to understand and keep pace with its possible transformations and influence in the world.

3 TECHNOLOGIES APPLIED TO INCLUSION AND TRANSFORMATION WORK

Digital technologies are increasingly important in the educational universe. They go beyond the mere label of technological instruments created to assist educational institutions and are increasingly aligned with the construction of inclusive and dynamic education in the contemporary educational landscape. Dantas, Santos, and Silva (2023) point out that digital technologies are increasingly integrated into pedagogical plans; they expand access to knowledge that is presented, worked on, and refined, contributing to inclusive and participatory education. By breaking barriers to access, communication, and participation, they work in a special way in how teaching and learning are developed pedagogically.

Martins and Ferreira (2022) state that Universal Design for Learning, directly supported by digital tools, redefines educational foundations by providing multiple ways to access and demonstrate lived and developed knowledge. In the field of inclusion, these tools function as accessible resources that guarantee the participation of all students.

This dynamic also drives the transformation of the school itself: by integrating technologies, institutions are led to rethink curricula, assessments, and pedagogical relationships. They cease to reproduce rigid models and begin to value collaboration, autonomy, and the joint construction of knowledge. Teachers, managers, multidisciplinary teams, and families begin to work in an articulated manner, using these resources to strengthen dialogue and monitor the comprehensive development of each student.

Technology alone does not produce change: its transformative power depends on investments in infrastructure, continuous teacher education, and public policies that guarantee equal access for all. According to Faria and Vieira (2024), far from deepening possible inequalities and their broad discursive context, when linked to public policies and pedagogical intentionality, these digital tools become essential instruments for building a fairer education for everyone. When applied with pedagogical intentionality, digital tools facilitate the development of learning, fulfill the right to quality education, and directly promote a school that embraces the differences presented, thereby advancing inclusion.

Digital technologies have introduced a renewed way of developing education. It is therefore indispensable to adopt new forms of curricular and pedagogical organization. In this regard, investments in public policies are essential in order to consolidate a new educational perspective for society. Technology has provided humanity with an unprecedented way of conducting teaching.

The implementation of new curricular and methodological structures is necessary, along with investments in public policies that ensure a transformative view of education. Technology has redefined the course of education. Therefore, curricular and pedagogical organization must be renewed, supported by public policies that make this new educational reality possible.

When integrated into a coherent pedagogical proposal, technologies cease to be merely technical resources and become part of a new teaching logic. Oliveira et al. (2024) state that technologies redefine the school institution by making it possible to personalize learning pathways, meeting different rhythms and needs, and by driving a change in conception in which plurality ceases to be the exception and becomes a guideline. They align with principles such as Universal Design for Learning, which provides multiple ways to present content, express knowledge, and engage students.

Multidisciplinary teams, families, and school management need to work together to define how, when, and which tools will be used, always prioritizing the student's comprehensive development. The conscious use of technologies also stimulates critical

thinking, collaboration, and the ability to solve problems, which are essential competencies for citizenship education in the contemporary world.

These tools allow each student to interact with knowledge according to their own possibilities: resources such as screen readers, captioning, alternative communication software, and adaptive platforms ensure that no one remains on the margins of the educational process. Unlike the traditional model, which required students to adjust to single standards, technology makes it possible to adapt teaching to each reality, in line with the principles of Universal Design for Learning, which advocates multiple pathways for learning and expression.

According to Ferrari and Souza (2022), resources such as screen readers, alternative communication, and adaptive platforms break down participation barriers, but their transformative potential is only realized when accompanied by teacher training and a welcoming school structure.

There is no doubt that technology always moves toward renewal, encouraging participatory and collaborative methodological work among teachers, support teams, and families, since it is not merely a matter of placing state-of-the-art devices in classrooms, but of using them intentionally to build an education that recognizes differences and thereby promotes respect and appreciation in light of principles and ethics.

4 FINAL CONSIDERATIONS

Digital technologies are truly significant and relevant instruments in the construction of knowledge. The educational landscape cannot remain outside this movement of new projects focused on applied technology. Teachers, educational managers, coordinators, and, above all, teachers need to be well prepared for this new way of applying knowledge.

A teacher who does not seek to stay up to date, and a school that does not seek to invest in the potential of its teachers, especially regarding digital technology and its application in the classroom, is out of the market. Therefore, ongoing training for education professionals is important.

State and municipal schools and private institutions must continually train their teachers, preparing them for the innovations of digital technology, because education is part of a process of construction and unfinished work in which research, study, and staying current on the part of teachers and managers make a major difference in the school environment. Schools work with projects, organization, statistical data on student performance, and inclusion; therefore, digital technologies applied to education play a role in society.

Thus, it is important to invest not only in teacher education, but also to ensure that the school environment is prepared for the new demands of education and for work toward an education that values equality and respect for differences. Technology, above all, must serve citizens. Education is a service that must always be ready to welcome; it must embody collaboration, the construction of knowledge, and partnership between teachers and students, because this is an environment in which everyone learns.

It is therefore concluded that the actors in education—supervisors, coordinators, and teachers—must continually invest in response to possible changes in education, applied digital technologies, and the dynamics of education experienced by all. Therefore, when training teachers for the classroom context, it is important that they have the support of other educational managers and have access to appropriate technology for working with knowledge in the classroom.

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