Article

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DIFFERENT GENERATIONS: STUDENTS AND TEACHERS IN THE DEVELOPMENT OF DIGITAL COMPETENCIES AND EDUCATIONAL POLICY GUIDELINES (1996 a 2023) [1]

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Abstract:

Technologies developed throughout history have driven advancements and posed challenges to society. In education, one of the challenges is integrating technological resources into the learning process of students from different generations to promote digital competencies for all. This study analyzed educational documents and programs to understand the evolution of policies aimed at the inclusion of technological resources in schools. The results indicate that the policies and programs seek to modernize education and expand access to knowledge. However, for the development of digital competencies to occur, it is essential to ensure equitable access to knowledge, invest in providing digital devices, connectivity for vulnerable students, and continuous training for educators.

Keywords: Digital skills; Different generations; Education; Educational policies; TDIC.

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DIFERENTES GENERACIONES: ESTUDIANTES Y DOCENTES EN LA CONSTRUCCIÓN DE COMPETENCIAS DIGITALES Y LAS ORIENTACIONES DE LAS POLÍTICAS EDUCATIVAS (1996 a 2023)

Resumen: Las tecnologías desarrolladas a lo largo de la historia han impulsado avances y desafíos para la sociedad. En el ámbito educativo, uno de los principales retos es integrar los recursos tecnológicos en el aprendizaje de estudiantes de distintas generaciones, con el fin de promover las competencias digitales para todos. El objetivo fue analizar críticamente la incorporación de las tecnologías en la educación brasileña entre 1996 y 2023, destacando hitos históricos y políticas que orientan el uso de las Tecnologías Digitales de la Información y la Comunicación (TDIC) para el desarrollo de competencias digitales en docentes y estudiantes. Se trata de una investigación cualitativa, de carácter bibliográfico y documental, que examina legislaciones, programas y directrices educativas. Los resultados indican que las políticas y programas tienen como objetivo modernizar la enseñanza y ampliar el acceso al conocimiento. Sin embargo, para que se logre el desarrollo de las competencias digitales, es fundamental garantizar un acceso equitativo al conocimiento, invertir en el suministro de dispositivos digitales, en la conectividad para estudiantes vulnerables y en la capacitación continua de los educadores.

Palabras clave: Competencias digitales; Diferentes generaciones; Acceso a la educación; Políticas Educativas; TDIC.

DIFERENTES GERAÇÕES: ESTUDANTES E DOCENTES NA CONSTRUÇÃO DE COMPETÊNCIAS DIGITAIS E AS ORIENTAÇÕES DAS POLÍTICAS EDUCATIVAS (1996 a 2023)

Resumo: As tecnologias desenvolvidas ao longo da história impulsionaram avanços e desafios à sociedade. Na educação, um dos desafios é integrar recursos tecnológicos na aprendizagem de estudantes de diferentes gerações para promover as competências digitais para todos. O objetivo foi analisar criticamente a inserção das tecnologias na educação brasileira entre 1996 e 2023, destacando marcos históricos e políticas que orientam o uso das TDIC para o desenvolvimento de competências digitais de professores e estudantes. Trata-se de uma pesquisa qualitativa, de natureza bibliográfica e documental, que examina legislações, programas e diretrizes educacionais. Os resultados indicam que as políticas e programas objetivam modernizar o ensino e ampliar o acesso ao conhecimento. Mas para que o desenvolvimento das competências digitais ocorra, é fundamental proporcionar acesso equitativo ao conhecimento, investir no fornecimento de dispositivos digitais, na conectividade para estudantes vulneráveis e na capacitação contínua dos educadores.

Palavras chave: Competencias digitais; Diferentes generações; Acceso a educação; Políticas Educativas; TDIC.

Introduction

The various technologies developed throughout history have played a significant role in the advances of society as a whole. In this context, while their premise is the improvement of daily life and the addressing of emerging demands, technological innovations, especially those related to the advent of the Internet, have not only revolutionized access to knowledge but have also brought challenges to new forms of work, communication, interaction, learning, and teaching, among others, breaking down geographical and cultural barriers (Anjos et al., 2024; Lima; Cavichioli, 2019).

In this regard, the author Pierre Lévy (2001) analyzes that the creation of a virtual space through the Internet triggered the constitution of its own culture, in which time and space are unified. In this scenario, science gained greater openness for the expanded exchange of its knowledge production.

Another important milestone in this evolutionary process of technologies is the advent of the "Digital Age." In this period, the analog transmission signals of various devices (such as televisions, mobile phones, computers, etc.) were replaced by digital signals. This resulted in a qualitative leap in image and sound transmission, intensifying the simulation of the user's experience in virtual immersions (Lima; Cavichioli, 2019; Lima Junior; Dantas; Andrade, 2021; Moreno, 2013).

In addition, in his work "Cyberculture," Pierre Lévy (2001) explores the transformations brought about by digitalization in the production, transmission, and consumption of information. He compares the analog era, in which information is continuous and degrades with each copy or transmission, with the digital era, in which information is encoded discreetly, allowing for copies and transmissions without a significant loss of quality. In this sense, Lévy also adds that digitalization has brought new forms of communication, such as hyperdocuments and digital interactions, which profoundly impact culture and communication.

In line with this understanding, Castells (2011) argues that the transition from analog to digital constitutes the technological substrate of the network society, emphasizing that this technological transition is fundamental for the structuring and functioning of the networks that characterize the information age.

In this sense, it is worth clarifying that, throughout history, the transformations of technological resources, which came to be part of daily social life, led to the formation of different generations that interact with each other. In this context, although they present differences in age and realities, they are brought closer together by using the same "cultural objects" (mobile phones,

notebooks, social media, etc.).

In this scenario, the author Prensky (2001) calls the generations that preceded the advent of the Internet "digital immigrants," such as the Veterans, Baby Boomers, Generation X, and Generation Y (Lima; Cavichioli, 2019; Zaninelli; Caldeira; Fonseca, 2022). In contrast, "digital natives" comprise Generation Z and subsequent generations, such as the "Thumbelina" generation and Generation Alpha.

According to Zaninelli, Caldeira, and Fonseca (2022), Veterans are people born before and during World War II. They demonstrate respect for hierarchy, strictly follow rules, and are focused on work. Next is the Baby Boomer generation, composed of individuals born after World War II. This generation exhibits a conservative life pattern, characterized by seeking stable employment, marrying and having children, and buying a house and a car. On the other hand, Generation X is marked by a break with paradigms, the valuing of personal life over professional life, in addition to a concern for future generations. Subsequently, Generation Y, also known as Millennials, includes the first to be born into a completely globalized world. They prioritize quality of life, contact with friends and family, as well as a job that provides them with satisfaction.

Furthermore, according to the authors Zaninelli, Caldeira, and Fonseca (2022), digital natives, including Generation Z, were born completely immersed in the Digital Age. Social networks stand out as an important milestone of this period, in addition to online hyper-connection, which made borders cease to exist.

Likewise, the philosopher Michel Serres (2013), in his book "Thumbelina," explores the new generation of young people, named by him as “Thumbelina Generation” – due to the constant use of thumbs to type on mobile devices – highlighting that children of this generation can handle multiple pieces of information at the same time, in addition to arguing that this generation is significantly different from previous ones, due to the transformations brought about by digital technologies.

That is, according to the author, this generation, through the mobile phone, has “[...] access to all people; by GPS, to all places; by the Internet, to all knowledge” (Serres, 2013, p. 19). Regarding this view, Serres also highlights that this generation has developed new forms of communication, learning, and social interaction, for example, the ability to access, create, and share information instantly and globally.

Finally, Generation Alpha, as noted by Zaninelli, Caldeira, and Fonseca (2022), is characterized by children deeply immersed in the digital era, receiving stimuli that can potentially shape their versatile capacities in adulthood.

Thus, in this context of technological innovations and generations with different profiles

regarding the use of Digital Information and Communication Technologies (DICTs), various challenges arise. At school, one of the main challenges is to integrate the technological resources of daily social life into the curricular proposals, so that it is possible to take advantage of this revolution of networked knowledge. To this end, educational policies are fundamental to guarantee this integration, as they have the conditions to provide the means and guidelines for the implementation of these new technologies.

In this sense, it should be emphasized that the insertion of technological tools in education is a recurring theme in educational policies in Brazil and around the world, as these resources can enhance and transform educational processes. In this regard, Sena (2023) highlights that the history of technologies in education is marked by continuous innovations that transformed teaching and learning. Therefore, the evolution of this insertion projects the idea of a future more accessible to education, with the challenge of integrating these technologies effectively to benefit the diversity of students present in the educational context.

However, the issue is not limited to integrating countless educational technological resources into the classroom, but to promoting students' digital social inclusion through the development of digital competencies. This, in turn, is not necessarily defined by the number of tools available, but by the pedagogical practice of the teacher, whose objective is student learning so that they know how to apply technologies responsibly, efficiently, and considering their future possibilities for social inclusion (Behar, 2013).

On this aspect, Behar (2013) defines digital competence as a set of knowledge, skills, and attitudes (KSA), which must be developed by teachers and students, to use digital resources to their maximum potential and with responsibility.

Therefore, from these considerations, we pose the following question: how have educational policies and programs that indicate the insertion of technological resources in schools promoted the digital competencies of teachers and students from different generations, with the objective of digital inclusion?

Thus, with the objective of fostering this question, this essay aims to critically analyze some historical milestones on the insertion of technologies in education in Brazil, from the creation of the Secretariat for Distance Education (SEED) in 1996, to the Law of the National Digital Education Policy promulgated from Law 14,533 of 2023, which provides guidance on the needs of including Digital Information and Communication Technologies (DICTs) in schools for the development of digital competencies of teachers and students (Brasil, 2023b).

This work is a qualitative study, of a bibliographic and documentary nature, that analyzed some educational legislations and programs to understand their evolution in the process of

including technological resources in schools.

Documentary and bibliographic research are similar because they use existing materials, but they differ in the nature of the sources: bibliographic research is based on secondary sources, such as books and scientific articles, while documentary research uses primary sources not yet analyzed, which requires a more careful approach from the researcher (Oliveira, 2007).

The research analyzes educational legislations and programs considered primary sources, such as Decree nº 1,917/1996 (creation of SEED), the LDB (Law nº 9,394/1996), ProInfo, the BNCC (2018b), the Connected Education Program (Brasil, 2020), the BNCC Computing (Brasil, 2022), Law nº 14,533/2023 (National Digital Education Policy), the MEC Technology and Innovation Report (2021) and the More Science in School Program (Brasil, 2024), seeking to understand the insertion of digital competencies in Brazilian education.

The analysis of the chosen educational legislations will be qualitative and will be divided into two thematic axes, namely: a) historical overview of legislation and programs for the inclusion of digital technologies in education and b) education in the digital age: reflections on the proposals present in the legislations.

Historical overview of legislation and programs for the inclusion of digital technologies in education

Over the last few decades, the integration of technologies in Brazilian education has been underscored by a series of policies and initiatives that seek to modernize teaching and expand access to knowledge. In this context, — as will be verified later in this essay —, some historical milestones reflect the continuous effort to adapt the educational system to the demands of the digital age, such as the creation of specific governmental structures, like Proinfo (Brasil, 1997), and the implementation of innovative programs, such as Connected Education (Brasil, 2017a).

Such actions encourage educational institutions to keep up with technological transformations, promoting inclusive and connected education. Thus, it is imperative to revisit these milestones to understand their importance and impacts on the contemporary educational scenario.

In 1996, the Secretariat for Distance Education (SEED) was created under the Ministry of Education (MEC), by Decree No. 1,917, of May 27, 1996, with the purpose of promoting the integration of Information and Communication Technologies (ICTs) in education, as well as developing distance education in order to democratize and improve the quality of teaching (Brasil,

1996a).

In effect, the formalization of SEED boosted the creation of university programs for the introduction of technologies in schools and for teacher training, with the aim of ensuring the implementation of its programs throughout the country, considering the diversity and regional characteristics. To this end, SEED articulated partnerships with state and municipal education secretariats, which were responsible for coordinating national guidelines with local policies and particularities.

In this context, one of the initial moments of the insertion of technologies in education in Brazil was the creation of the National Educational Technology Program (ProInfo), in 1997, by the Ministry of Education (MEC) (Brasil, 1997) and restructured in 2007. The objective of ProInfo was to promote the pedagogical use of Information and Communication Technologies (ICTs) in public schools, seeking to improve the quality of teaching, through the implementation of computer labs, internet access, and computers for students and teachers. In addition, the program offered training and education so that teachers could use technologies in their educational practices.

Later, in 2007, in order to accelerate digital inclusion, the Presidency of the Republic established new guidelines for ProInfo through Decree No. 6,300, of December 12, 2007, with the purpose of promoting actions to ensure the pedagogical use of information and communication technologies in public basic education networks" (Brasil, 2007a, p. 1, 2007b).

In this scenario, Almeida and da (1999, p. 2) highlight the importance of integrating technological resources into pedagogical practices, offering support to educators to explore informatics in teaching, combining pedagogical reflections and educational theories.

Also in this conjecture, Martins and Flores (2015) observed that the implementation of technologies in schools, promoted by ProInfo, requires continuous monitoring and evaluation by the Ministry of Education, since this process of formative and constant evaluation is crucial for timely interventions and the improvement of the program's results.

Currently, the ProInfo program continues to play a crucial role in the country's educational policy. Such permanence was possible due to the adaptations involved over these years, since, initially, it was focused on the distribution of computers and the creation of computer labs. But, currently, the program has included the distribution of tablets for teachers and the continuous training of educators for the pedagogical use of ICTs.

A decade later, in 2017, the Connected Education Program was launched, with the objective of expanding internet access and promoting technological infrastructure in Brazilian public schools. The initiative aimed to offer quality connectivity, technological devices, and

teacher training for the use of technologies in the classroom (Silva; Casagrande, 2020). Since then, the program has provided significant advances in the digital inclusion of schools and in the promotion of innovative pedagogical practices. For example, students and teachers have access to digital resources, online platforms, and possibilities for interaction and collaboration in a globalized context.

Under this prism, it should be noted that the Connected Education Innovation Program, formalized by Decree No. 9,204 on November 23, 2017 (Brasil, 2017a), stands out as an important innovation initiative, as it is aligned with strategy 7.15 of the National Education Plan, approved by Law No. 13,005 of June 25, 2014 (Brasil, 2014).

In this sense, according to the Ministry of Education (Brasil, 2017b, p. 7), the program involves the participation of the following entities:

> Ministry of Education (MEC), Ministry of Science, Technology, Innovations and Communications (MCTIC), and partners, such as the Center for Innovation for Brazilian Education (CIEB), the Lemann Foundation, the National Council of Education Secretaries (CONSED), and the National Union of Education Directors (UNDIME).

The program's plan provides for its progressive implementation, including schools in both urban and rural areas. This process is guided by the principles established by the Ministry of Education (Brazil, 2017b, p. 8), which include:

> Equity of conditions among public basic education schools for the pedagogical use of technology; Promotion of access to innovation and technology in schools located in regions of greater socioeconomic vulnerability and low performance in educational indicators; Collaboration among federated entities; Autonomy of teachers in adopting technology for education; Encouragement of student protagonism; Access to the internet with quality and speed compatible with the pedagogical needs of teachers and students; Broad access to quality digital educational resources; and Encouragement of training for teachers and managers in pedagogical practices with technology and for the use of technology.

Regarding the program, Silva and Casagrande (2020) explain that Educação Conectada was structured around four essential dimensions: vision, training, digital educational resources, and infrastructure. These areas complement each other and must be balanced for the use of digital technologies to positively impact education and contribute to reducing social inequalities. For the authors, the program aims to modernize the traditional school to face the challenges of the knowledge society, centralizing educational technology in the innovation of basic education.

A year later, in 2018, the MEC, in partnership with the Ministry of Science, Technology, Innovations, and Communications, launched the Science in School Program, with the objective of

encouraging science, technology, innovation, and scientific education in Brazilian schools. Thus, through the program, technological resources, teacher training, and stimulation of scientific research for students were offered. In this scenario, technology was fundamental for the promotion of scientific knowledge, as it allowed access to updated information, the conducting of virtual experiments, and the exchange of experiences among students from different regions.

Likewise, the implementation of the National Common Curricular Base (BNCC), in 2018, also represented a significant milestone in the insertion of technologies in Brazilian education. This occurred because the document established the knowledge and skills that all students must develop throughout basic education. Thus, within the scope of the BNCC, technology is recognized as one of the transversal curricular components, highlighting its importance as a pedagogical tool in all areas of knowledge, since it encourages the integration of digital devices, multimedia resources, and collaborative practices in school activities.

Therefore, the BNCC proposes to prepare students for the digital world, through a critical participation in the information society, in addition to establishing guidelines for the development of the Digital Culture competence throughout Basic Education, namely:

> Understand, use, and create digital information and communication technologies in a critical, meaningful, reflective, and ethical way in various social practices (including school ones) to communicate, access and disseminate information, produce knowledge, solve problems, and exercise protagonism and authorship in personal and school life (Brasil, 2017b, p. 9).

In this regard, Menezes (2019) clarifies that the BNCC establishes what basic education in Brazil should be like, setting objectives, procedures, and skills to be developed over the years. Under this guidance, it is up to each school to promote, from early childhood education to high school, all the competencies defined by the document, in order to contribute to the comprehensive formation of students.

Thus, based on the authors' considerations about the programs and laws presented, it is necessary to carry out a general reflection, so that it is possible to more deeply understand the context and implications of these initiatives in the educational system.

Education in the digital age: reflections on the proposals present in the legislation

But, after all, what is the "Digital Age"? To clarify this historical period, it is essential to differentiate between analog and digital tools. As we will see below.

The insertion of digital tools in education brought a significant change in relation to analog methods, since, while analog tools depended on physical materials and traditional teaching methods, digital ones provide quick access to a vast amount of information, promote more interactivity, offer flexibility to study anywhere and anytime, in addition to facilitating collaboration between students and teachers. These changes made education more accessible to the needs of the 21st century.

In this scenario, Moura (2009, p. 129) points out that the school still remains in an analog phase, contrasting with the digital communication processes that predominate in other spaces of society. That is, the predominance of paper culture is verified, while the student has other communicative practices, which involve the screen of a computer or cell phone.

Thus, in the search for adequacy and the creation of opportunities in the public network, the Digital Education Program was launched in 2019, with the purpose of encouraging the use of digital technologies in schools, the training of teachers for their use, and the production of digital educational content.

With this, it would be possible to develop digital competencies in students, promoting a more inclusive, participatory, and connected education to the contemporary world. Thus, through the program, technological resources were made available, such as tablets, laptops, and digital tools, which allow for the development of more dynamic and interactive educational activities.

Currently, the program is part of a greater effort to digitize education in Brazil and, for this, it expanded the initiatives, such as the National Digital Education Policy (PNED), in addition to continuing to promote the integration of digital technologies in schools, the training of teachers, and the incentive for digital educational content.

Consequently, the MEC, in its 2021 Technology and Innovation Report, offers a comprehensive vision on the use of technologies and innovations in education. In the text, the ministry highlights the importance of teacher training for the pedagogical use of technologies, the extension of internet access in schools, and the appreciation of innovation as a fundamental element for the improvement of educational quality (Brasil, 2021). The report also underlines the need for public policies that promote the research and production of educational technologies, as well as the integration between the school environment and digital environments.

Likewise, the report reveals that the high-tech sector is in rapid expansion, currently valued at 350 billion dollars, with the forecast that this value will exceed 3.2 trillion dollars by 2025. In this sense, UNCTAD highlights that the post-Covid-19 recovery offers a unique opportunity for governments and the international community to use these new cutting-edge technologies as tools to face the inequalities exacerbated by the pandemic.

A year later, in 2022, the BNCC Computing was launched as a complement to the BNCC, with the purpose of offering guidelines for all stages of Basic Education. Thus, according to the document prepared by the MEC, computing would enable the exploration and experience of playful experiences, promoted by interaction with peers, since they would be connected to various fields of knowledge in Early Childhood Education. For this, they should be guided by some essential premises:

> 1. Develop the recognition and identification of patterns, building sets of objects based on different criteria such as: quantity, shape, size, color, and behavior. 2. Experience and identify different forms of interaction mediated by computational artifacts. 3. Create and test algorithms by playing with objects from the environment and with body movements individually or in a group. 4. Solve problems by decomposing them into smaller parts, identifying steps, stages, or cycles that repeat and that can be generalized or reused for other problems (Brasil, 2022, p. 1).

According to Oliveira et al. (2024), the text "BNCC and Computing" has become a national reference regarding the implementation of classes that address the axes of Computational Thinking, Digital World, and Digital Culture at all levels of Basic Education in Brazil. This is because the document, in addition to guiding educators in the integration of these themes into the curriculum, also establishes guidelines for the development of essential skills for the future, such as the ability to solve problems, the understanding of the impact of digital technologies on society, and the promotion of an inclusive and ethical digital culture.

Subsequently, in 2023, the National Digital Education Policy was instituted through Law 14,533 of 2023, representing another advance in relation to the insertion of technologies in Brazilian education (Brasil, 2023b). In this context, this legislation aims to integrate Digital Information and Communication Technologies (DICTs) into the school environment, enabling the recognition and use of these tools for the development of students' digital competencies.

The law also emphasizes the need to incorporate DICTs into school curricula at all levels of education, from basic education to higher education. Finally, it also seeks to prepare students for an increasingly digitalized world, developing essential skills, such as digital literacy, which involves a basic understanding of how to use digital tools, and internet safety, which teaches students to protect their personal information and avoid online risks.

Likewise, the policy also addresses the importance of continuous teacher training, so that they can use DICTs effectively in the teaching-learning process. To this end, the program includes the offer of courses and training programs aimed at the pedagogical use of digital technologies and the improvement of technological infrastructure in schools, in order to ensure that all educational

institutions have access to adequate equipment and connectivity, so that they have the conditions to develop digital competence.

From this perspective, Cruz et al. (2023) state that in the educational context, digital competence is fundamental for both teachers and students, as it directly impacts the quality and effectiveness of the teaching-learning process. According to the authors, digital competence "allows for the adoption of a socio-interactive model that enhances a partnership work between teachers and students, and among students, leading to the acquisition of metacognitive methods" (Cruz et al., 2023, p. 29).

Thus, the implementation of the National Digital Education Policy is expected to transform education in Brazil, as its objective is to align the educational system with the demands of the 21st century, developing digital competencies early on, preparing students for the job market and for life in a highly connected and technological society. In addition, by training teachers and improving school infrastructure, the law seeks to reduce inequalities in access to digital education, ensuring that all students, regardless of their location or socioeconomic condition, have equal opportunities for learning and development.

However, one of the challenges of the law is to guarantee universal access to DICTs for students, teachers, and schools, integrating these technologies into the curriculum and teaching to transform the school into a space for active learning, citizenship, and democracy.

Likewise, launched at the end of 2023, the National Connected Schools Strategy (ENEC) seeks to universalize access to quality internet in Brazilian basic schools by 2026. In nine months, more than 120 thousand schools were benefited, with an investment of R$ 8.8 billion to improve connectivity, equipment, and pedagogical training, prioritizing the North and Northeast regions. Complementary programs also support this expansion.

Finally, in 2024, specifically on June 11, the Ministry of Education (MEC), in collaboration with the Ministry of Science, Technology and Innovation (MCTI) and the National Council for Scientific and Technological Development (CNPq), launched the More Science in School program, financed by the National Fund for Scientific and Technological Development (FNDCT). The newly launched program is in the public call phase for the selection of proposals from Scientific, Technological, and Innovation Institutions (STIs) that wish to establish cooperation networks with basic education schools at the territorial level.

The main objective of the program is to develop activities focused on the digital and scientific literacy of students and teachers. To this end, interested STIs must apply, through a call for proposals, to form state networks and implement maker labs. As a criterion, the proposals must prioritize digital literacy and scientific and technological education in basic education, with an

emphasis on public municipal elementary schools (final years) and high school, preferably in a full-time schedule.

Therefore, as can be seen, there is a growing effort to insert and integrate technology into education in Brazil. However, according to Aureliano and Queiroz (2023), despite the attention and this purpose, various challenges persist, limiting its transformative potential, such as aspects linked to social inequality. In other words, social conditions still significantly limit access to technologies in the country, resulting in "a more closed teaching and learning process, even involuntarily, depriving some students belonging to less favored social classes of having the right to learn made effective" (Aureliano; Queiroz, 2023, p. 13).

There are paths and challenges to make digital integration in education viable, while as ways to overcome the challenges and contribute to digital insertion in education, Anjos et al. (2024) explain that teacher training emerges as a central element in the recommendations. That is, it is not just about providing tools, but about investing in the continuous training of teachers. To this end, the author suggests the implementation of personalized professional development strategies to train educators to integrate technologies effectively and aligned with educational objectives.

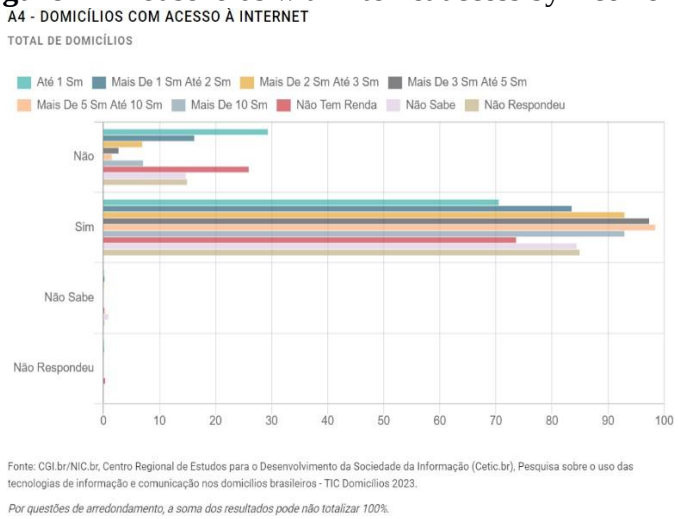
Another relevant alternative is the promotion of distance learning, which aims to democratize access to education and bring educators and students from the most diverse educational institutions closer together throughout Brazil and the world. Such a reality can be possible, as this modality allows more people to have the opportunity to learn, regardless of their geographical location. However, it should be noted that this approach can become exclusionary if there are no adequate measures to ensure the availability of infrastructure, devices, and connectivity in less developed areas or with less purchasing power.

Another step towards the democratization of access to digital technologies refers to the Regional Center for Studies for the Development of the Information Society (Cetic.br), which conducts annual research in Brazil on the use of information and communication technologies (ICTs) in households and in education since 2005. The research aims to map the access to ICTs in urban and rural households in the country and their forms of use by individuals aged 10 or more (Cetic.br).

Thus, to understand the substance of this research and to analyze with more precision the reality of Brazilian households, with or without internet access, considering family income, we present the graph: Households with internet access by income. It presents the proportion of households with internet access in Brazil, according to the monthly family income bracket (in minimum wages). The horizontal bars indicate, in percentage, the number of households with and

without internet access, in addition to those who did not know how to answer or did not answer. Each color represents a different income bracket, which allows for the comparison of access between different socioeconomic strata. The reading should be done by observing, for each response category (Yes, No, Don't Know, Didn't Answer), the percentage distribution of households by income bracket. This allows for an analysis of how income influences internet access in Brazilian households.

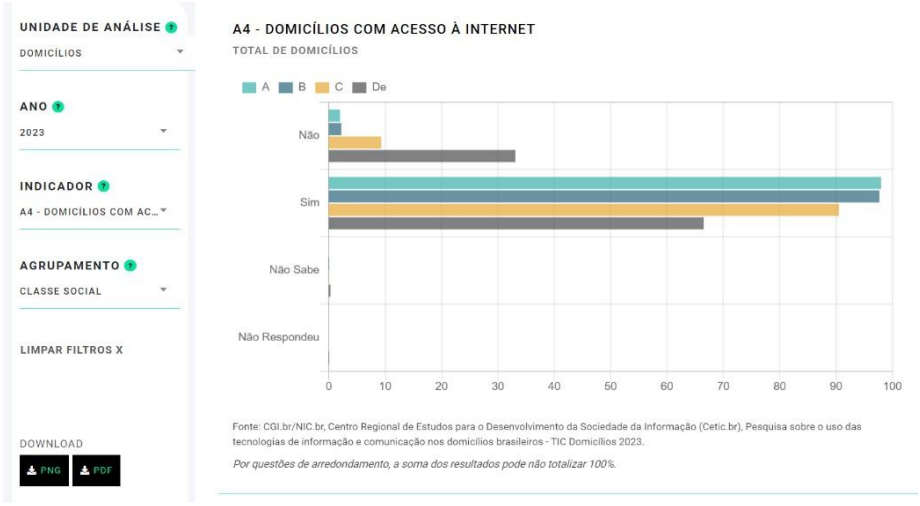
Figure 1 – Households with internet access by income – Cetic.br



Source: Regional Center for Studies for the Development of the Information Society (Cetic.br, 2023; Nic.br, 2023).

The graph: Households with internet access, which presents the proportion of Brazilian households with internet access, according to social class (A, B, C, or D/E), based on data from the 2023 ICT Households survey. In it, the horizontal bars represent the percentage of households in each class that answered "Yes," "No," "Don't know," or "Didn't answer" about internet access. The different colors represent the different social classes, allowing to visualize how access varies among them. The analysis of the graph allows us to identify that classes A and B concentrate the highest rates of connectivity, while classes D and E still have a significant proportion of households without access.

Figure 2 –Households with internet access by income – Cetic.br



Source: Regional Center for Studies for the Development of the Information Society (Cetic.br, 2023; Nic.br, 2023).

The information presented in graphs 1 and 2 shows that low-income families are the most affected by the lack of basic infrastructure for internet access. This situation significantly limits the development of educational activities in many schools, as students frequently lack the necessary resources to follow classes or complete proposed activities. Thus, it becomes evident that the lack of access to technological resources is part of a broader process of social and economic exclusion, to which a large portion of the population is subject, resulting from the current production system. Under this veil, according to Santos (2006), social inequality manifests in various forms in people's daily lives, directly impacting the right to access quality education and, consequently, access to digital inclusion, this being

> [...] a particular facet of social inclusion issues, and the former cannot be undertaken in the absence of the latter. On the other hand, inclusion (digital or social) is a pair of exclusion (idem), with social exclusion itself being a particular manifestation of social inequalities, especially those that are expressed under the label of poverty (Santos, 2006, p. 15).

Moreover, regarding schools, it is worth noting that students who do not have access to quality internet face additional barriers that hinder their learning and academic development. In other words, this is because this condition directly affects the ability to implement innovative pedagogical practices and to integrate digital technologies into the curriculum.

In effect, such a situation perpetuates the cycle of educational inequality and limits the future opportunities of these young people. Therefore, it is necessary to reverse this picture and,

to do so, there is a need for effective public policies and targeted investments to ensure that all students have equal access to the essential digital tools for learning in the 21st century. In this regard, Grossi, Costa, and Santos (2013, p. 71) warn that:

> Given that social inequality favors digital exclusion and, in turn, this reinforces social inequality, a new posture and a new perspective are needed from the government to decrease the perverse picture of Brazilian inequality. It is necessary to appropriate DICTs, through digital inclusion programs that allow the citizen to perceive themselves as part of this technological world.

Thus, although the introduction of technologies in education has been an important advance in Brazil, it is still necessary to expand access in schools, train teachers, and encourage innovative practices, ensuring that technology is integrated into the curriculum in an educational way and with equal access for all students.

Therefore, it is imperative to reiterate that the role of the school, as established by Law 14,533, in the National Digital Education Policy, is fundamental for the formation of digital competencies in students and teachers (Brasil, 2023b). This means that it is necessary to provide guidance on the inclusion of Information and Communication Technologies (DICTs) in the school environment, promote actions that develop Digital Competence, and contemplate these actions in order to develop knowledge, skills, and attitudes, according to the KSA model, addressed by Behar, "[...] competencies are a set of elements composed of Knowledge, Skills, and Attitudes, summarized in the acronym KSA" (Behar, 2013, p. 16).

Being so, to fulfill this function, schools must implement actions that integrate DICTs effectively, ensuring that the curriculum not only incorporates technologies but also uses them as tools to enhance learning. This demands the continuous training of teachers, enabling them to work with students in an innovative and interactive way.

Final Considerations

Over the last few decades, the integration of technologies in Brazilian education has been driven by a series of policies and initiatives aimed at modernizing teaching and expanding access to knowledge. In this sense, as this study has verified, these historical milestones reflect the continuous effort of Brazil's educational public policies to adapt the educational system to the demands of the digital age.

As a result of these initiatives, this research verified several advances, including the creation

of specific governmental structures, such as: Decree No. 1917 of 1996 and the creation of the Secretariat for Distance Education (SEED); the National Educational Technology Program (ProInfo) and Law No. 9,394 of 1996 (LDB) (Brasil, 1996b), to the implementation of innovative programs, such as: the Connected Education Innovation Program (2017a); the National Common Curricular Base (BNCC, 2018b); the Digital Education Program (Brasil, 2019); the MEC's 2021 Technology and Innovation Report (Brasil, 2021); the BNCC Computing (Brasil, 2022); the National Digital Education Policy, instituted by Law 14,533 of 2023, and the More Science in School Program (Brasil, 2024). All with the purpose of having schools follow technological transformations, through the promotion of a more inclusive and connected education.

In addition, as became evident, the insertion of technologies in Brazilian education is fundamental for educational reform. However, for its effectiveness to be consolidated, it is essential that it be integrated into the school curriculum in an educational and equitable way, ensuring that all students have equal access to technologies. Once this is done, the school will be in line with the National Digital Education Policy, established by Law 14,533 of 2023, which seeks the formation of digital competencies in students and teachers, in view of the need for an education aligned with the demands of the 21st century.

Nevertheless, it is essential to note that social inequality in Brazil is a factor that must be considered, as a significant number of families do not have access to technological devices, stable internet connection, and adequate spaces for online learning. These factors, consequently, result in a digital divide, in which students from more affluent families can fully benefit from digital educational opportunities, while the less privileged face exponential difficulties in accessing and following the same processes and possibilities.

In this scenario, it is worth clarifying that, as compared in this study, the training of teachers for the effective use of technology is also affected by inequality, as educators who work in less favored regions may have limited access to training and capacity-building in educational technology, which, as a consequence, incisively harms the ability to integrate these tools effectively into their teaching practices.

That is, although the integration of technologies in Brazilian education already has several programs, investments are still needed to overcome these challenges. To this end, it is essential that the government, educational institutions, and society adopt concrete measures to ensure equity in access to educational technology. Such action, in turn, includes the creation of digital inclusion programs, the availability of devices and connectivity for students in vulnerable situations, in addition to investment in the continuous training of teachers for the effective integration of technologies into their pedagogical approaches. This way, only through these actions will it be

possible to better explore the potential of technology as a tool to reduce, and not aggravate, educational inequalities in Brazil.

Consequently, the present study also verified that developing students' digital competence is essential to prepare them for the challenges of the modern world, while the training of teachers is equally vital, as they are the mediators of this educational process.

On this path, we cannot fail to mention that, according to the generations studied, all students born after 2010 are immersed in digital culture, this being something present in their daily lives. Thus, the coexistence of different generations of students and teachers in the educational environment implies challenges and opportunities in the incorporation of technologies into the teaching and learning process.

In addition, as was analyzed, for this to be possible, there must be continuous training programs for educators, so that they build technical knowledge of digital tools, develop pedagogical teaching skills, in addition to ethical attitudes in the application of digital technological resources for the promotion of learning in school.

In the same way, it is observed that, by developing these competencies, educators will be able to guide students on the responsible use of technologies, helping them to understand the risks of excessive use and the importance of maintaining a healthy balance. That is, in addition to the contributions already mentioned, the school can also foster the formation of digitally competent and conscious citizens.

To this end, it is necessary to continue investing in policies and programs that promote teacher training, technological infrastructure in schools, and the production of digital content so that, in this way, it is possible to achieve a true transformation in education, with the formation of students prepared for the challenges and opportunities of the 21st century.

It should also be noted that the present article is not political in nature, remaining impartial regarding the analysis of public policies and programs that have been implemented over the years for the insertion of technology in education and focusing on examining government initiatives and their impacts on technological development.

Finally, although this study has presented important advances on policies for the insertion of technologies in education, there are still gaps that must be faced. The main one is the distance between what is foreseen in the policies and what, in fact, happens in schools. In addition, the specific realities of different regions of the country were not addressed, which can directly influence access to and use of technologies. Thus, future studies can explore these experiences with teachers and students, listening to those who are at the forefront of the educational process. It will also be fundamental to follow how the most recent policies, such as the National Digital

Education Policy, will be implemented in practice and whether they will, in fact, manage to promote a more just, digital, and accessible education for all.

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