Chapter 218

Technological advances in public education policies in Brazil: An integrative review

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ABSTRACT
Introduction: Education policies are ensured by the federal constitution and other laws, such as the law of guidelines and bases of national education (law No. 9,394/96), and aim to find solutions to the great social challenges in education, minimizing the different levels of schooling, as well as social differences within the classroom. Objective: To describe technological advances in public education policies in Brazil. Method: This is an integrative review elaborated from the following steps: definition of the hypothesis and objectives of the review; establishment of inclusion and exclusion criteria of articles (sample selection); definition of the information to be extracted from the selected articles; evaluation of the results; discussion and presentation of the results and conclusion. Results: The research revealed that public education policies have been expanding and improving according to developments in the economic, social, political, cultural, and technological aspects of society. Discussion: The studies make it clear that ICT has contributed in various sectors, having more positive than negative results, but there are still many changes to be made so that technologies contribute even more to this digital society. Final considerations: Public education policies are increasingly integrating Information and Communication Technologies (ICT) into their government policies. However, there has been an advance in the implementation of technology in the area of education, where it is believed that all these transformations and technological resources will be part of the educational curriculum since we are in the twenty-first century.

Keywords: Technology, Education policy, Education.

1 INTRODUCTION

Education policies are ensured by the federal constitution and other laws, such as the law of guidelines and bases of national education (law No. 9,394/96), and aim to find solutions to the great social challenges in education, minimizing the different levels of schooling, as well as social differences within the classroom[(1)].

In addition, public policies guarantee education, evaluate, and help improve the quality of education in the country, being linked to all measures and decisions that are established by the government. In Brazil, educational policies have undergone several reframations over the years[(2)].

In the 70s Brazil wanted to have autonomy for the computerization of society where the main interest was political and economic, it was then that technology began to be part of this scenario, since that time it was believed that the educational sector would have the capacity to promote technological and scientific advancement. One of the concerns of the scholars was to understand that technologies contribute at great speed to the expansion of capitalism, in this perspective, there is a need for the intervention of the school and the teacher to form citizens capable of analyzing the facts without sticking to the preconceived theories, that is, with the necessary ability to build a democratic technological form[6].

Therefore, in the last decades of the twentieth century, the development in the areas of information and communication technology contributed to great transformations in society, especially in the area of education, resulting in a continuous process of evolution that contributed to intensifying the crisis of the great rigid and hierarchical systems providing new ways of intensifying social movements[6].

In 1985, with the first government initiatives of technology in education, the EDUCOM project was created, and coordinated by the MEC, which consisted of the implementation of pilot centers in public universities, focused on research in the use of educational informatics, the training of human resources and the creation of subsidies for the development of policies in the sector[5].

One year later, the Program of Immediate Action in Informatics in Education of 1st and 2nd Degrees focuses on the preparation of a new policy, evaluation of EDUCOM, training, and promotion of software production[5].

The restructuring of public administration in general decisively redefined the role of the state in the configuration of public educational policies, with the advent of the federal constitution of 1988 in Brazil[1].

The Federal Constitution of 1988 guarantees in Article 205 that "education, the right of all and the duty of the State and the family, shall be promoted and encouraged with the collaboration of society, aiming at the full development of the person, his preparation for the exercise of citizenship and his qualification for work"[7].

Article 218 of the 1988 Constitution says that "The State shall promote and encourage scientific development, research, and technological training. § 3 The State shall support the training of human resources in the areas of science, research, and technology, and shall grant to those who occupy them special means and conditions of work"[7].

Then, in 1992, the national program of educational informatics (PRONINFE) was created. In 1997, this program was replaced by the national educational technology program (ProInfo), which was considered the main program in Brazil and is still in force today[5].

In 2007, the integrated ProInfo was born, which aimed to integrate different initiatives, namely: Broadband Program at School (PBLE); design of one computer per student (UCA), and Distribution of tablets[5].

In November 2017, Decree No. 9,204 instituted the integrated education innovation program, developed by the Ministry of Education, which aims to support the universalization of access to high-speed internet, by land and satellite, and to foster the use of digital technology in basic education[5].

The National Education Plan (PNE) 2014-2024 presents indicators for the use of technologies in education, and digital culture, for being one of the characteristics of contemporary society, thus understanding innovation and technology as strategies to achieve the desired educational purposes [8,10].

Information and communication technologies (ICT) arrive in the classrooms in the face of a connected generation, which increasingly demands and invites society to understand the world from new perspectives [3,4].

The applicability of technologies, in all circumstances, gives rise to new social practices, especially regarding the ease of receiving and sending information. These changes that are part of daily life today interfere directly with the values and thinking, techniques, and attitudes of individuals (LÉVY, 1999), instituting what we call digital culture[3].

Thus, there is a need to describe technological advances in public education policies in Brazil.

2 METHOD

This is an integrative review elaborated from the following steps: definition of the hypothesis and objectives of the review; establishment of inclusion and exclusion criteria for articles (sample selection); definition of the information to be extracted from the selected articles; evaluation of results; discussion and presentation of results and conclusion.

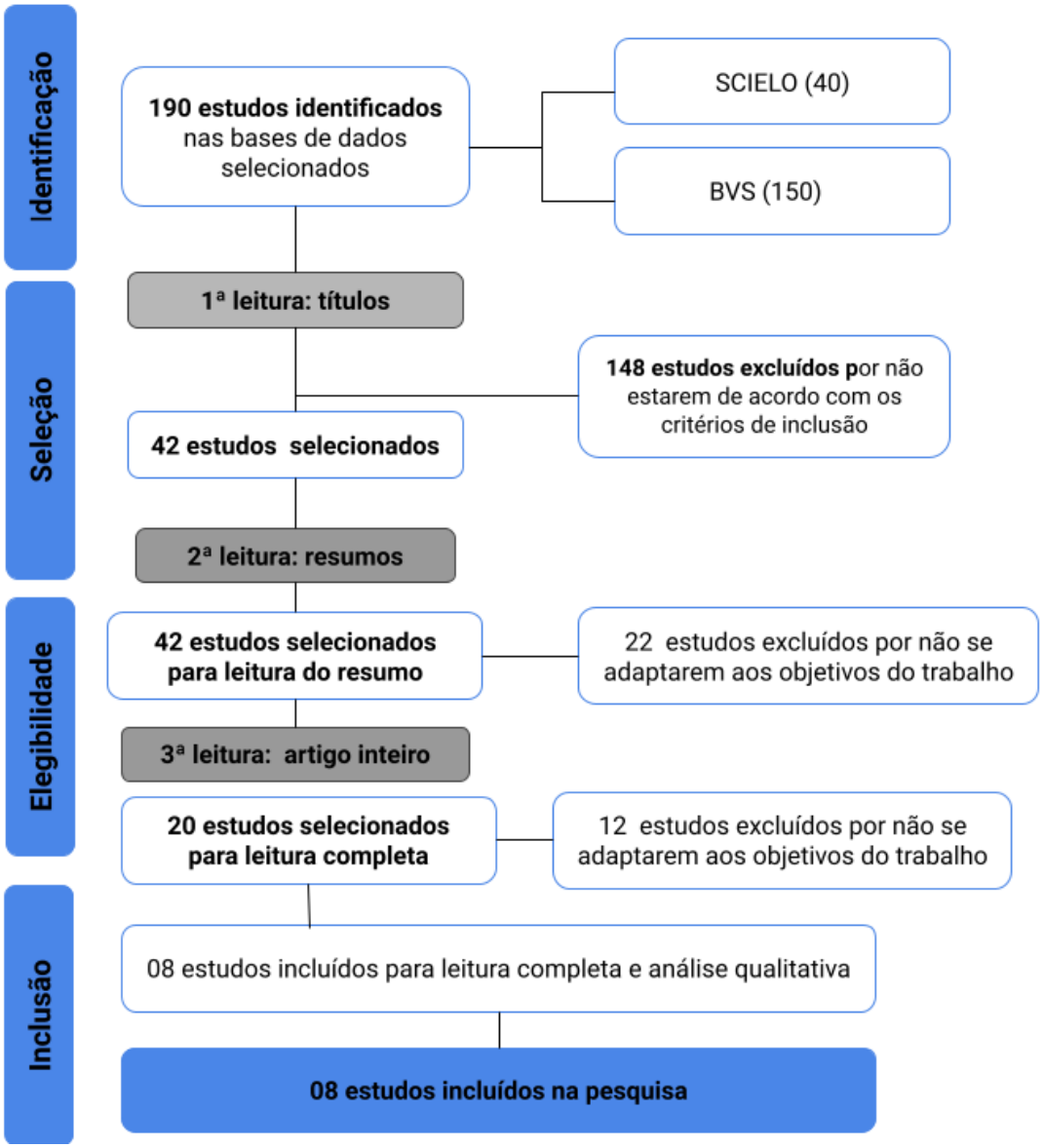
To guide the review, the following question was formulated: What are the technological advances in public education policies in Brazil?

To select the articles, a search was performed in the database of Scielo and VHL Regional. For the search, the descriptors based on the DeCS were used, and thus the search strategy was assembled: technology AND education policy AND education.

The inclusion criteria defined for this review were: Full articles, in the language Portuguese and English, published in the last 5 years.

We found 190 articles addressing the theme, however, after the application of the inclusion and exclusion criteria, and also the reading of titles and abstracts, a total of 8 (eight) articles resulted.

Figure 1 - Article Selection Method.



Source: own authorship.

3 FINDINGS

We found 190 articles addressing the theme, however, after the application of the inclusion and exclusion criteria, and also the reading of titles and abstracts, a total of 8 (eight) articles resulted.

Table 1: Summary of the articles used.

(MARTÍNEZ, *et al.* 2021)	It presents analyses that reveal the arguments of supranational organizations such as the OECD and UNESCO on the implementation of ICT in education. For the OECD, despite the economic effort of the countries, the introduction of technology in the educational field has not shown good results in improving learning, just look at the results of PISA. Despite other elements that cause this problem, such as deficiency of educational policies or low-quality educational applications, it was finally found that the methodology used and the training of teachers that is hindering learning with ICT. In this way, its goal is to transform education to achieve a future state in which teachers elaborate twenty-first-century pedagogies and thus encourage students to develop the skills necessary for their future. UNESCO, on the other hand, is created according to the need to make use of ICT to achieve the 2030 goals in education. Both institutions aim for important changes in school methodology, the role of students, and especially teachers[12].
(BORLE, *et al*. 2021)	There is a great concern for the health, especially of older professionals, of work-related exposure to technology, information, and communication (ICT) and the research has shown that only the use of (ICT) does not impact older workers, but the intensification of digital work has negative associations with mental health and workability (TA)[13].
(SANTOS, *et al*. 2018)	It requires analysis in the discussion of the delicate relationship of education and technology in the contextual aspects considering the current time and history since there are new ways of learning from the advancement of digital technologies[14].
(ANDRADE AND VALADÃO, 2017)	Due to the various forms of instrumentation of public action based on social technologies, there is a great need for public power to look at the construction of public policies related to the dynamics of this process[15].
(MUGISHA, *et al*. 2021)	Digital learning resources can reduce costs compared to printed material and also have additional advantages with interactive resources, as already reported in other research, but the use of digital learning resources depends on the support of the state board of education and need to be planned and adapted according to the ICT limitations of schools and appropriate experiences of teachers with the use of ICT[16].
(RANA, *et al*. 2018)	The research indicates a significant negative relationship with the results in the countries of the Organization for Economic Cooperation and Development OECD when it comes to income inequality, ethnic diversity, and evolution in access to and use of ICT, in contrast, there are improvements in the level of ICT skills and higher levels of health spending, with public funding show statistically significant and positive associations with better health outcomes. Another positive point is that with the increase in national income, the development of technology and the levels of higher education also improve the health outcomes of a country[17].
(GONÇALVES NETA, 2017)	Through the means of educational technologies, new ways of teaching and learning emerge, and then there is a new resignification of learning in the scope of home care, where these technologies are inserted in-home care, enhancing the production of care, but even so, there is a challenge to analyze what is the educational reality in the micropolitical sphere of home care in the area of the unified health system[18].
(GIARETTA, 2018)	ICT has also contributed to social movements in large urbanizations, amplifying opportunities for action and mobilization of resources in the search for more inclusive and sustainable spaces. Promoting ways of acting, dialogue, dynamics, and innovations. Concerning public participation, the use of ICT has changed and resignified this concept through social movements[19].

Source: Direct research.

4 DISCUSSION

The research revealed that public education policies have been expanding and improving according to developments in the economic, social, political, cultural, and theological aspects of society. With the sudden changes that have occurred in recent months due to the Pandemic, Information and Communication Technologies (ICT), which have been improving and modifying over the years to keep up with the pace of development and transformation of society, have had an accelerated in its implementation, to meet the necessities of various sectors, where these changes have remained.

UNESCO and the OECD are two international entities that decisively influence the educational policies of countries and both organizations position ICT as a central and transformative element of a new education within the political discourses on education[12]. And all previous ones analyzed documents from these two institutions, on the implementation of ICT, and it was observed that both seek important changes around the school methodology, the role of students, and the role of teachers, mainly[12]. These methodologies for the "twenty-first century" are based on previous pedagogical models, but now the neoliberal logic appropriates and transforms into a new narrative in public education[20].

On the other hand, there are implications concerning exposure to ICT, in the socioeconomic sense, age, and mental health. Research reports that the effects of work-related ICT exposure on health may differ according to economic position (SEP). Another says that inequalities due to different working conditions have a tremendous impact on the health of workers[21]. There are also concerns among older workers regarding the use of ICT. Studies have shown signs of negative results only when exposure to ICT included the experience of informing the digital work of these employees[13].

In the area of health, the use of and access to ICT has positive and negative impacts. Other previous studies argue the potential health benefits of the development, access, and use of ICTs[17]. Their findings found that ICT improves the dissemination and communication of health information and knowledge, thus contributing to the increase in health literacy and healthier life statistics[22,23]. Increasing access to and use of ICT can improve the country's public health outcomes[24,25]. On the other hand, they found that the use of ICT is related to the perceived health status in other studies, they concluded that excessive use of ICT can cause musculoskeletal problems[26,27]. Some studies have associated the access and use of ICT with unhealthy and unhealthy styles of the vid[28].

Still dealing with the advances of technology it also contributes to social movements in large cities, where the results achieved with ICT in the action of these movements are positive, such as the expansion of the search for governance, contributing to the displacement of barriers to reach in less time, cost and geographical distance of information, engagement, and articulation with national and international spheres, promoting new ways of thinking in this twenty-first century[19].

Concluding this discussion, the studies make it clear that ICT has contributed in several sectors, having more positive than negative results, but there are still many changes to be made so that technologies contribute even more to this digital society.

5 FINAL CONSIDERATIONS

It was observed that public education policies have increasingly been integrating ICT into their government programs. Technology was a great ally in this context of the pandemic, being able to offer, digital platforms with online classes among others, thus narrowing some gaps and sequelae that remained in education due to the moment we are living.

But on the other hand, there were gains with these resources that signaled to us that it is possible to narrow distances facilitating actions for quality education. We believe that all these transformations and technological resources will be part of the educational curriculum, since we are in the twenty-first century and one of its characteristics is a connected society, increasingly linked in a digital culture.

But on the other hand, there is much to improve to have a good result with ICT, such as the infrastructure of schools and other places of other institutions, training of professionals, compliance with public policies, and reform of representative democratic institutional mechanisms.

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