

## The advancement of new technologies and the use of free software in the digital inclusion of public schools

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### ABSTRACT

This article sought, through an explanatory and exploratory study, to analyze the information society, which has been transformed by the emergence of new Information and Communication Technologies (ICTs). Such an analysis is pertinent, in view of the need to ensure the fundamental right to education in public schools through the use of free software, since some public policies are insufficient. In this context, considering the process of exclusion that has been a determining force in the perpetuation of social roles, reflections are proposed on the necessary expansion of the concept of digital inclusion, as well as analyzing the public policies already implemented by the Brazilian government, in addition to evaluating the possibility of applying free software to public schools, as a way to promote education. access to information and technology, and promoting democracy.

**Keywords:** Digital inclusion, Information society, Free software, Public policies.

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## INTRODUCTION

In today's society, it is a reality that digital technologies are present and widely used, being an integral part of life in society. Public schools play an essential role in promoting education universally, and one of their goals is to provide access to digital technologies. Digital technologies are present in all sectors of society, including public school education, and the integration of these technologies into education has a significant impact in creating changes and alterations in relation to the culture of a society.

Integrating digital technologies into school education requires considering several factors, such as the ease and speed of access to information, as well as the mobility of students. It is not possible to think about the integration of technologies without considering that they bring with them new classroom dynamics, innovative curricular approaches, different teaching practices, new didactics and new norms of social coexistence.

Knowledge acquisition is a crucial process in which an individual obtains knowledge and skills through experiences, skills, and studies. On the other hand, public educational policies have the responsibility to develop programs that bring digital inclusion to public schools.

In this sense, the second chapter will demonstrate that the federal government, together with the states and municipalities, has been committed to developing digital inclusion programs to provide educational technological resources to Brazilian public schools. This initiative seeks to strengthen the relationship between teachers and students, in addition to promoting inclusion in public educational institutions. However, digital inclusion goes beyond the mere provision of computer labs, computers or physical connections, and is not limited only to access to one or another piece of software.

It is also necessary to consider how this digital technology will be able to meet the needs of teachers, students, managers and other individuals involved, enabling access to information properly in the school. In this way, the present work aims to demonstrate, from the data collected, the importance of digital inclusion through free software as a public policy for the realization of the fundamental right to education in public schools.

## INFORMATION SOCIETY AND DIGITAL CULTURE IN THE EDUCATIONAL CONTEXT

In recent decades, there has been an intense process of innovation in the areas of microelectronics, microinformatics and microbiology, which, when combined, have generated several changes in society. According to Manuel Castells, although most of the technological innovations necessary for the development of new means of information emerged in the second half of the twentieth century, the dissemination of these technologies intensified from the 1970s onwards<sup>2</sup>.

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<sup>2</sup> CASTELLS, Manuel. The network society. 6. ed. v I. São Paulo: Paz e Terra, 1999, 698p, p. 76.



In this dynamic context, in this global society where technologies and science play a prominent role in shaping society as a whole, the concept of "knowledge society", "information society", "network society" and "cyberculture" emerges. According to Castells, who uses the term "network society", the denominations "information society" and "knowledge society" are considered inadequate, since information and knowledge are inherent to human society, not limited only to this global era we are currently experiencing, being inseparable elements of the development of the individual, who creates and shapes history through technologies<sup>3</sup>.

On the other hand, Pierre Lévy adopts the term "cyberculture" to describe this new culture that differs from the previous ones, being known as digital culture. Cyberspace, composed of information and users who interact to build a space for communication, acts as a catalyst for society's cultures to change and adapt according to the moment<sup>4</sup> experienced.

Despite the discussions about the correct terminology, they all have the same goal in common: to portray the effects of the new technological era on society and how it has been transforming contemporary forms of relationship and communication, through the processing of information for the construction of knowledge<sup>5</sup>.

In this sense, Lévy argues that, just like the emergence of writing and printing, which were significant for humanity, the internet would be responsible for an expansion of human cognitive capacities.

Adam Schaff argues that increased interactivity and communication would result in the elimination of artificial barriers between cultures, contributing to combating cultural xenophobia. This would occur due to the increased circulation of information, which would lead to the development of a supranational culture, enriching the human personality, making individuals ascend to a higher level of culture, and then change the model of personal reference and social character<sup>6</sup>.

From the point of view of political processes, the technical possibilities of technologies allow for a profound restructuring of the public sphere, due to the exchange of information between individuals, the creation of electronic conferences, access to public information made available by governments, and the possibility of implementing a system of consultation with citizens, through the holding of plebiscites. among other ways<sup>7</sup>.

Thus, the reality of public policies gains a new demand, a new dynamic. In its implementation, it is necessary that the State and society coexist in a dialectical relationship in which

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<sup>3</sup> CASTELLS, Manuel. The network society. 6. ed. v I. São Paulo: Paz e Terra, 1999, 698p, p. 98-99.

<sup>4</sup> LÉVY, Pierre. Cyberculture. 1. ed. São Paulo: Editora 34, 1999, 264p, p. 17-18.

<sup>5</sup> CASTELLS, Manuel. Change is in people's minds. Fronteiras – Interview with Luís Antônio Giron. Available at: <https://www.frenteiras.com/leia/exibir/manuel-castells-a-mudanca-esta-na-cabeca-das-pessoas>. Accessed on: 20 set. 2023.

<sup>6</sup> SCHAFF, Adam. The Computer Society: the social consequences of the second industrial revolution. Translated by Carlos Eduardo Jordão Machado and Luiz Arturo Obojes. 4th ed. São Paulo: Editora da UNESP: Brasiliense, 1995, 157p, p. 81.

<sup>7</sup> CASTELLS, Manuel. The network society. 6. ed. v I. São Paulo: Paz e Terra, 1999, 698p, p. 166.



both public policy influences and affects society and is influenced by it. In this sense, Celia Kestenetzky in her work "The Welfare State in the Age of Reason" explains that the current era should be considered as a new stage of the welfare state, in which changes of a qualitative nature have occurred - less intensely in the macro aspect and more comprehensively in the micro structure of the programs. where principles of inclusivity and generosity lie – and a redefinition of the relationship between public and private is taking shape<sup>8</sup>.

As seen, the evolution of digital information and communication technologies has transformed and opened new opportunities for society in all its dimensions, especially in the field of education. In this sense, Tadao Takahashi points out that, in the new economy, it is not enough to have a modern communication infrastructure; It is necessary to have the ability to transform information into knowledge<sup>9</sup>.

The concern is education aimed at the formation of a literate society, which knows how to take advantage of the benefits of the digital world and has the ability to understand how to use information and acquire knowledge from it. It is through education that competent individuals are formed, capable of living in society, exercising their citizenship and acting critically<sup>10</sup>.

Dermeval Saviani brings a connection between the relations of education and technology, showing education as a process of formation of the human being and from it understand that technology is a means of transformation of man, and it is necessary to use it to modify the environment in which he lives<sup>11</sup>, since it is through education that the individual is humanized and can also humanize the technologies used<sup>12</sup>.

Thus, it can be seen that information and communication technologies are indispensable to establish a quality education, since students are born immersed in the digital world, learning from an early age to master technologies, acquiring skills and knowledge to take advantage of these mechanisms<sup>13</sup>.

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<sup>8</sup> KERSTENETZKY, Celia Lessa. *The Welfare State in the Age of Reason: The Reinvention of the Welfare State in the Contemporary World*. 1. ed. Rio de Janeiro: Elsevier, 2012. 319 p, p. 86. ISBN 97835261929.

<sup>9</sup> TAKAHASHI, Tadao. *Information society in Brazil: Green Paper*. 1. ed. Brasília: Ministry of Science and Technology (MCT), 2000, 195p, p. 7.

<sup>10</sup> CARVALHO, Máyra Ribeiro de. *Technology and digital inclusion: challenges and possibilities in basic education*. Advisor: Katielly Vila Verde Araújo Soares. 2022. 59 p. Monograph (Degree in Pedagogy) - Faculdade de Inhumas (FACMAIS), Goiás, 2022, p. 22.

<sup>11</sup> For more information see: MOURA, Ricardo Damasceno; CONRADO, Monica Prates. *Intercultural dialogues: variations from the concept of diversity to the inclusion of people with disabilities through digital devices*. *Journal of Fundamental Rights & Democracy*, [S. l.], v. 22, n. 3, p. 253–271, 2017. DOI: 10.25192/issn.1982-0496.rdfd.v22i3984. Available at: <https://revistaeletronicardfd.unibrazil.com.br/index.php/rdfd/article/view/984>. Accessed on: 20 set. 2023.

<sup>12</sup> SAVIANI, Dermeval. *Historical-critical pedagogy: first approximations*. 11. rev. ed. São Paulo: Autores Associados, 2011, 137p, p. 80-84.

<sup>13</sup> CARVALHO, Máyra Ribeiro de. *Technology and digital inclusion: challenges and possibilities in basic education*. Advisor: Katielly Vila Verde Araújo Soares. 2022. 59 p. Monograph (Degree in Pedagogy) - Faculdade de Inhumas (FACMAIS), Goiás, 2022, p.22.



In addition to being part of students' lives, digital technologies also contribute to boosting new ways of teaching and learning, reconfiguring practices and breaking old structures that were once seen as ready-made and finished models, but which are now questioned and face challenges. Traditional education is seen as an outdated model that is distant from the new reality that emerges from technologies, valuing innovative and constructive characteristics.

According to José Moran, traditional methodologies are already obsolete, in which students only receive information through the memorization of content to take tests, while teachers only expose and pass on knowledge, without worrying about the development of students' critical sense<sup>14</sup>. Paulo Freire calls this type of teaching banking education, where the student is seen as a bank where the teacher deposits knowledge. In contrast to this approach, the author presents another conception, being considered the ideal model to be achieved: the "liberating education", which seeks the active participation of the student in the face of reality, through debates, stimulating him to reflect and question the world<sup>15</sup>.

However, using new technologies without proper planning and thorough analysis continues to result in a traditional education, where the student is still a simple receiver of knowledge and the teacher is the absolute holder of knowledge. It is clear, therefore, that there is a need to use technologies to provide students with critical thinking, innovation and creativity, preparing them to fully exercise citizenship.

Moran, in this regard, emphasizes that technology should enrich the educational environment, becoming a space where teachers and students build knowledge together, transforming the environment in which they live<sup>16</sup>. In addition, Vani Kenski adds that technologies offer schools the possibility to open up and provide education to all, without exception. The intensive use of the latest digital technologies and networks transforms the dimensions of education and expands schools to the size of the world<sup>17</sup>.

However, it is common knowledge that there are many challenges that make it difficult for public schools to have the appropriate conditions and professionals to implement this practice in the classroom, especially when associated with social inequality, being a serious problem that prevents students from having access to these resources, resulting in the digital and social exclusion of individuals.

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<sup>14</sup> MORAN, José Manuel; ALMEIDA, Maria Elizabeth Bianconcini de (org.). *Integration of Technologies in Education: Leap into the Future*. São Paulo: [s. n.], 2013, 326p, p. 89-90.

<sup>15</sup> FREIRE, Paulo. *Pedagogy of the oppressed*. 17. ed. Rio de Janeiro: Paz e Terra, 1987, 129p, p. 37-38.

<sup>16</sup> MORAN, José Manuel; ALMEIDA, Maria Elizabeth Bianconcini de (org.). *Integration of Technologies in Education: Leap into the Future*. São Paulo: [s. n.], 2013, 326p, p. 87-94.

<sup>17</sup> KENSKI, Vani Moreira. *Education and technologies: the new rhythm of information*. 8.ed. Campinas: Papirus, 2012, 144p, p. 124.



Therefore, digital inclusion emerges as a way to combat exclusion, through actions that allow the population to be digitally included, and this aspect must be incorporated into public schools, so that all students have the same opportunities and know how to use technologies to transform their environments.

## **BRAZILIAN PUBLIC POLICIES FOR DIGITAL INCLUSION**

In Brazil, there is an alarming number of approximately 140 million digitally excluded<sup>18</sup>. In the current context, it is essential that children and young people have access to these media as soon as possible, because according to a recent study carried out by OECD/Eurostat, it is found that 98.76% of companies are equipped with computers, and that 96.29% use the internet in their business<sup>19</sup>. Children, who will be future workers, must be included in this reality in order to avoid social exclusion in the future.

In addition, it is important to consider the impact of the computer on various areas of human life, such as leisure, education, health, industry, commerce and research, so that ignoring its role in the formation of the individual limits their possibilities of interaction with the world, both at work and in personal relationships. Being on the margins of informational processes, without material and intellectual resources to use the computer and the internet, prevents the integration of these people into the world, whether in the professional aspect or in virtual social interactions, resulting in digital exclusion, by keeping these individuals away from the technologies necessary to live in today's society<sup>20</sup>.

According to Castells, the digital divide can be caused by several aspects, such as: lack of technological infrastructure, economic and institutional barriers to access to networks, lack of educational and cultural capacity to use the internet autonomously, and disadvantage in the production of content shared through networks<sup>21</sup>.

From this perspective, the Map of Digital Inequalities in Brazil, published by RITLA – Latin American Technological Information Network, in 2007, shows that only 21% of the population aged 10 and over uses the internet in Brazil. The same survey highlights the Brazilian regional inequality

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<sup>18</sup> For more information see: HUPFFER, Haide Maria; SANTANNA, Gustavo da Silva. Infoexcluded and the right to education: the cruel face of inequality exposed during covid-19. *Journal of Fundamental Rights & Democracy*, [S. l.], v. 27, n. 3, p. 95–123, 2022. DOI: 10.25192/issn.1982-0496.rdfd.v27i32073. Available at: <https://revistaeletronicardfd.unibrasil.com.br/index.php/rdfd/article/view/2073>. Accessed: 1 out. 2023.

<sup>19</sup> Brazilian Institute of Geography and Statistics (IBGE). Summaries of indicators 2009. Available at: Available at: [https://www.ibge.gov.br/?id\\_noticia=1455&id\\_pagina=1](https://www.ibge.gov.br/?id_noticia=1455&id_pagina=1). Accessed on: 23 set. 2023

<sup>20</sup> BATISTA, Diogo Mendes. One computer per student program: implementation of a public policy for digital inclusion?. Advisor: Shirleide Silva Cruz. 2011. 71 p. Course Completion Paper (Licentiate in Pedagogy) - University of Brasilia, Brasília, 2011, p. 30. Available at: [https://bdm.unb.br/bitstream/10483/2292/1/2011\\_DiogoMendesBatista.pdf](https://bdm.unb.br/bitstream/10483/2292/1/2011_DiogoMendesBatista.pdf). Accessed on: 23 set. 2023.

<sup>21</sup> CASTELLS, Manuel. *Internet Galaxy: Reflections on the Internet, Business and Society*. 1. ed. Rio de Janeiro: Zahar, 2003, 244p, p. 210.



in terms of digital inclusion, showing that connectivity poverty is more pronounced in the Northeast region, with only 11.9% of internet access, the lowest rate among all regions of the country<sup>22</sup>.

When comparing information between students from public and private schools, there is a significant increase in the number of internet accesses. According to the same survey, 38% of students have access to the internet in Brazil, whether at school, at work or at home. However, the data reveal that, within this universe, the number of students from private schools who access the internet in the country reaches an impressive 83.6%, while only 37.3% of students from public high schools have access. The situation is even more worrisome in public elementary schools, with only 17.2% of students able to connect<sup>23</sup>.

The data reveals that a significant portion of public school students are not benefiting from digital inclusion programs in schools, despite recent efforts by the state. Júlio Waiselfisz emphasizes that the intention is to demonstrate that efforts are being insufficient to overcome inequalities, so that with the current progress, it will take a few decades to reach the levels of the advanced countries that currently exist, and, in the future, these countries will already be at another level<sup>24</sup>.

One of the main consequences of this exclusion for students in Brazilian public schools is of an economic nature, as the lack of knowledge of new technologies results in exclusion from the labor market, which is increasingly restricted. Another relevant aspect is the deprivation of the new forms of social interaction currently observable in society<sup>25</sup>.

The information provides an overview of the digital divide process in the country and guides the creation of public policies to overcome this scenario. In this sense, Caroline Bitencourt and Janriê Reck point out that public policies should be considered as a way to materialize constitutional commitments related to social justice, the reduction of social inequalities and the realization of human dignity. Public policies should be seen as a tool to plan for the future and overcome the crisis, but also to create the desired future<sup>26</sup>.

Based on this, several public educational policies are being implemented to promote digital inclusion in public schools, some aimed specifically at students and others offering training to teachers<sup>27</sup>.

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<sup>22</sup> SILVA, Maria Aparecida Ramos da. Importance of evaluating public policies for digital inclusion in education. Annals of the XVII Humanities Week of the Federal University of Rio Grande do Norte, Natal: [S.n.], 2009, p. 01-09, p. 04.

<sup>23</sup> SILVA, Maria Aparecida Ramos da. Importance of evaluating public policies for digital inclusion in education. Annals of the XVII Humanities Week of the Federal University of Rio Grande do Norte, Natal: [S.n.], 2009, p. 01-09, p. 05.

<sup>24</sup> WASELFSZ, Júlio Jacobo. Pencil, Eraser and Keyboard. Information Technology in Education – Brazil and Latin America. Brasília: 2007, p. 44. Available at <<http://www.ritla.net>> . Accessed on: 20 set. 2023.

<sup>25</sup> SILVA, Maria Aparecida Ramos da. Importance of evaluating public policies for digital inclusion in education. Annals of the XVII Humanities Week of the Federal University of Rio Grande do Norte, Natal: [S.n.], 2009, p. 01-09, p. 05.

<sup>26</sup> BITENCOURT, Caroline Müller; RECK, Janriê. Brazil in crisis and the response of public policies: diagnosis, guidelines and proposals. Curitiba: Íthala, 2021. 201 p, p. 20. ISBN 97857650868.

<sup>27</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 35. Available at: <http://bdtd.uftm.edu.br/handle/tede/449>. Accessed on: 23 set. 2023.



Teixeira and Marcon highlight the crucial role of public policies in strengthening all those involved in the educational process, and that they consider universities as partners in the search for an education based on the logic of networks, implying the recognition that digital inclusion processes are fundamental for the exercise of citizenship and provide teachers with the opportunity to experience and develop a collaborative culture<sup>28</sup>.

For Takahashi, it is essential to foster digital literacy, which will allow the acquisition of basic skills for the use of computers and the internet, in addition to training people to use these media in order to meet individual and community interests and needs<sup>29</sup>.

However, Teixeira and Marcon explain that digital inclusion is not limited to simple access to the computer or the internet, nor to the mere reproduction of professional resources, but rather to the proposal of activities that consider the resources of digital technologies as facilitators of autonomy and protagonism. In this way, digital inclusion points to an approach that values not only the form of access, but also the construction and experience of a network culture as essential elements for the exercise of citizenship in contemporary society<sup>30,31</sup>.

In this sense, public policies for digital inclusion in Brazil began with the enactment of the Information Technology Law<sup>32</sup>, whose objective was to promote the country's insertion in the digital age, with an emphasis on information technology. This commitment was reiterated in 1996 by the Law of Guidelines and Bases of Education (LDB),<sup>33</sup> which ensures the training of teachers and education professionals, and highlights the importance of basic digital technological education, as well as the understanding of the entire historical process of transformation of society and culture in this panorama<sup>34</sup>.

In 1997, the National Program for Informatics in Education (ProInfo) was created, financed in part by the Inter-American Development Bank (IDB), with the purpose of distributing 100,000 computers in public schools in Brazil<sup>35</sup>. This policy marks the beginning of the process of

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<sup>28</sup> TEIXEIRA, A. Canabarro, MARCON, Karina (org.). Digital inclusion: experiences, challenges, and perspectives. Passo Fundo: Ed. Universidade de Passo Fundo, 2014. p. 17.

<sup>29</sup> TAKAHASHI, Tadao. Information society in Brazil: Green Paper. 1. ed. Brasília: Ministry of Science and Technology (MCT), 2000, p. 7.

<sup>30</sup> TEIXEIRA, A. Canabarro, MARCON, Karina (org.). Digital inclusion: experiences, challenges, and perspectives. Passo Fundo: Ed. Universidade de Passo Fundo, 2014. 278p, p. 42.

<sup>31</sup> RONDELLI, Elizabeth. Four steps to digital inclusion. I-Coletiva Magazine, June 24, 2003, p. 01.

<sup>32</sup> BRAZIL. Law 8.248, of October 23, 1991. It provides for the training and competitiveness of the information technology and automation sector, and makes other provisions. Available at: [https://www.planalto.gov.br/ccivil\\_03/leis/18248.htm](https://www.planalto.gov.br/ccivil_03/leis/18248.htm). Accessed on: 23 set. 2023.

<sup>33</sup> BRAZIL. Law 9.394, of December 20, 1996. It establishes the guidelines and bases of national education. Available at: [https://www.planalto.gov.br/ccivil\\_03/leis/19394.htm#:~:text=L9394&text=Estabelece%20as%20diretrizes%20e%20base%20da%20educa%C3%A7%C3%A3o%20nacional.&text=Art.%201%20A%20education%20covers,civil%20and%20in%20cultural%20manifestations%20](https://www.planalto.gov.br/ccivil_03/leis/19394.htm#:~:text=L9394&text=Estabelece%20as%20diretrizes%20e%20base%20da%20educa%C3%A7%C3%A3o%20nacional.&text=Art.%201%20A%20education%20covers,civil%20and%20in%20cultural%20manifestations%20). Accessed: 24 Sep. 2023.

<sup>34</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 50.

<sup>35</sup> BRAZIL. National Program of Informatics in Education – ProInfo: Guidelines. Brasília: MEC/SEED, 1997.



universalizing access to digital technologies and the internet in Brazilian public schools. The proposal is to establish a decentralized operational structure, in which the State Secretariats of Education (SEE) are responsible for managing the Educational Technology Centers (NTE), whose function is to train and advise teachers for the pedagogical integration of digital technologies<sup>36</sup>.

With ProInfo, the federal government seeks to insert the educational system in a more dynamic and receptive sphere to contemporary digital resources, acting with the purpose of encouraging the use of educational digital technologies in the public basic education system, equipping schools with computers, information technologies, educational content and broadband internet access<sup>37</sup>.

Subsequently, ProInfo developed the National Program for Continuing Education in Educational Technology (ProInfo Integrado), aiming to promote the pedagogical integration of digital technologies in public schools, stimulating the improvement of the teaching and learning process through this integration, as well as providing training to educational professionals involved in the program<sup>38</sup>'s initiatives. The main difference between the two programs is that the latter offers teacher training courses in public schools.

By fulfilling the proposed objectives, this program benefits not only the school community, but also the population near the schools, by preparing "young people and adults for the labor market through training for the integration of digital technologies".<sup>39</sup>

In 2010, the One Computer Per Student Program (PROUCA) was created, which adapts the *One Laptop Per Child* Program (OLPC), developed by researchers at the Massachusetts Institute of Technology (MIT).<sup>40</sup> PROUCA is an initiative of the Presidency of the Republic and was promoted, structured and coordinated together with the Ministry of Education (MEC), to integrate with educational plans and projects of educational technology. Its actions are part of the Education Development Plan (PDE) and are part of ProInfo<sup>42</sup>.

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<sup>36</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 51.

<sup>37</sup> FNDE, National Fund for the Development of Education. Ministry of Education, Brazil. 2013.

<sup>38</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 53.

<sup>39</sup> BRAZIL. Ministry of Education. National Educational Technology Program. ProInfo. 2014.

<sup>40</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 58.

<sup>41</sup> BRAZIL. Law No. 12,249, of June 2020. Establishes the One Computer per Student Program – PROUCA and the Special Regime for the Acquisition of Computers for Educational Use. Available at: [https://www.planalto.gov.br/ccivil\\_03/\\_ato2007-2010/2010/lei/112249.htm](https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/112249.htm). Accessed on: 24 set. 2023.

<sup>42</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 58.



Also, in 2005, the Media in Education program was launched by MEC in partnership with the Department of Distance Education (SEED). The program plans to train public school teachers to integrate digital technologies and different forms of communication into the teaching and learning process<sup>43</sup>.

There is also the program of the Secretariat of Basic Education of the Public Ministry of Education (SEB) and the Coordination for the Improvement of Higher Education Personnel (Capes), which carries out initiatives to support public policies for digital inclusion. With the help of scholarship researchers, the project will be able to point out improvements in the development of inclusion programs<sup>44</sup>.

In addition, the Broadband in Schools Program (PBLE) was launched in April 2008 and serves municipal and state public schools, and is managed in partnership with FNDE and the National Telecommunications Agency (ANATEL), together with state and municipal education departments. PBLE works together with PROUCA and ProInfo to enable comprehensive digital inclusion in schools, that is, it aims to promote inclusion in institutions, installing computers, offering training to teachers and providing educational content<sup>45</sup>.

According to the FNDE website, the Broadband in Public School Program aims to connect all public schools to the internet, using technologies that guarantee quality, speed and services to improve education in the country. These connections will initially be offered free of charge until the year 2025<sup>46</sup>.

Finally, the *Educational Tablet Program* was launched in the second half of 2012 and is one of the most recent digital inclusion programs developed by public policies, integrating ProInfo. Its objective is to distribute and allow teachers to adapt to a reality that is often already part of students' daily lives. Then, the second stage aims to distribute *tablets* to students<sup>47</sup>.

However, such public policies have proven to be insufficient and inadequate during the Covid-19 pandemic. During this period, students had to deal with teaching fully online and then in a hybrid way until the return of face-to-face classes, which was a challenge not only for students, but especially for teachers, who faced a situation of complete helplessness on the part of the education departments. This is because, in addition to not being prepared for a digital pedagogy, there were

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<sup>43</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 62.

<sup>44</sup> BRAZIL. Ministry of Education. One Computer per Student Project (UCA), 2012. Available at: <http://portal.mec.gov.br/component/tags/tag/uca>. Accessed on: 24 set. 2023.

<sup>45</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 66-67.

<sup>46</sup> FNDE, National Fund for the Development of Education. Broadband in Schools Program, Brasília: MEC, 2015.

<sup>47</sup> RICHITELI, Aurélio Alberto. Policies for digital inclusion: practices and possibilities in public schools. Advisor: Martha Maria Prata-Linhares. 2017. 160 p. Dissertation (Master in Education) - Federal University of Triângulo Mineiro, Uberaba, 2017, p. 71.



difficulties in relation to technological support for the school community (parents, students and educators).<sup>48</sup>

In this context, it was possible to observe that private schools, which are home to the majority of the middle class and also the elite, did not suffer so many losses in terms of delay in content, as they were able to adapt to remote teaching through online platforms, where classes were broadcast live. However, in a different way, in public schools, according to the research carried out by Bárbara Jaques, the government made digital platforms available, but without the support of students and teachers<sup>49</sup>. To reconcile and meet the different cases of students in situations of social vulnerability, educators produced printed materials that could be picked up at schools.

With the implementation of the hybrid system, gradually, with the return of face-to-face classes, the workload of teachers intensified even more, because in addition to producing printed materials, they needed to provide online support to students on leave and teach in person to those who attended classes in a rotation system, avoiding crowds during the pandemic<sup>50</sup>.

It can be observed that there are still major challenges for the integration of information and communication technologies into education. However, according to what was discussed, the first step has already been taken, which is to ensure that the school community has access to the technological infrastructure. There is still a long way to go in relation to the development of the pedagogical use of these tools, aiming at the production of knowledge and the promotion of citizenship.

In view of this, some contemporary elements are extremely significant and cannot be ignored, as they express in a profound and forceful way the conception of digital inclusion based on collaborative action and the free construction and circulation of knowledge, such as the phenomenon of Free Software.

## THE USE OF FREE SOFTWARE TO ACHIEVE DIGITAL INCLUSION IN PUBLIC SCHOOLS

The concept of software, at its core, is closely related to the concept of *hardware*. While the latter refers to physical equipment made of polymers and minerals, the former relates to electronic data and how that data is expressed. In this sense, both a computer program – when the data is

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<sup>48</sup> JAQUES, Bárbara Oliveira. Education and digital inclusion in times of pandemic. Advisor: Rosimeri Aquino da Silva. 2022. 37 p. Course Completion Paper (Degree in Social Sciences) - Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, 2022, p. 20.

<sup>49</sup> JAQUES, Bárbara Oliveira. Education and digital inclusion in times of pandemic. Advisor: Rosimeri Aquino da Silva. 2022. 37 p. Course Completion Paper (Degree in Social Sciences) - Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, 2022, p. 25-26.

<sup>50</sup> JAQUES, Bárbara Oliveira. Education and digital inclusion in times of pandemic. Advisor: Rosimeri Aquino da Silva. 2022. 37 p. Final Paper (Degree in Social Sciences) - Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, 2022, p. 26.



constituted via commands that work from games – and a movie recorded on a DVD – when the data is created in the form of information to be accessed by a program – are software<sup>51</sup>.

According to the way they are developed, software or computer programs can range from digital games to mobile applications, recording programs or even essential elements for the operation of computers. There are different classifications for software, one of them being related to its license – which can be free or non-free – and another related to the configuration of the data – open or closed<sup>52</sup>.

Free, or non-proprietary, programs are programs provided to users with the freedom to run, study, modify, and distribute (with or without modifications) without having to ask permission from the program's owner<sup>53</sup>. Free software refers to the simultaneous existence of four types of freedoms for the users of the program, established by the *Free Software Foundation*, which are: the freedom to run the program for any purpose; the freedom to study how the program works and adapt it to your needs; the freedom to distribute copies, and the freedom to improve programming and release its improvements. so that the whole community benefits<sup>54</sup>.

However, such conditions do not imply that free software is free, but are subject to specific licenses that ensure the freedom of distribution and modification of its source codes. The concept of free software, also known as *freeware*, is quite simple and straightforward. Free software can be copied and distributed at no cost, and you can use it without paying. This type of program is made available only in its binary form, i.e., as an executable program, which implies that the source code is not provided, meaning that it cannot be altered or examined, i.e., the program can only be used in the way it was originally made available, and there may also be restrictions regarding its distribution<sup>56</sup>.

Examples of free software are *Acrobat Reader* and *Real Player*.

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<sup>51</sup> MELO, Álisson J. M. Taxation and New Technologies. In: MACHADO, Hugo de B. Taxation and New Technologies: Software – Cryptocurrencies – Content Availability – Artificial Intelligence. 1. ed. São Paulo: Editora Foco, 2021. p. 01-32, p.03.

<sup>52</sup> LANDIN, Rita de Cassia de Souza. *Educational software* in the context of literacy and literacy: the early years of elementary school. Advisor: Maria Iolanda Monteiro. 2015. 169 p. Master's Dissertation (Master in Education) - Federal University of São Carlos, São Carlos, 2015, p. 91. Available at: <https://repositorio.ufscar.br/handle/ufscar/2766>. Accessed on: 24 set. 2023.

<sup>53</sup> FIGUEIREDO, Arianne V. de S.; SANTOS, Diogo D.; TOMIMORI, Eduardo M.; SILVA, Frank C.; MIRANDA, Isabella T. P. Free Software: advantages. *Maringá Management: Revista de Ciências Empresariales*, v. 2, n.1, p. 26-33, jan./jun. 2005, p. 27. Available at: <http://www.maringamanagement.com.br/index.php/ojs/article/view/37>. Accessed on: 24 set. 2023.

<sup>54</sup> In the same sense: "The freedom to use a program means the freedom for any type of individual or legal entity to use the software in any type of computer system, for any type of work or activity, without the need to communicate to the developer or any other entity in particular. FIGUEIREDO, Arianne V. de S.; SANTOS, Diogo D.; TOMIMORI, Eduardo M.; SILVA, Frank C.; MIRANDA, Isabella T. P. Free Software: advantages. *Maringá Management: Revista de Ciências Empresariales*, v. 2, n.1, p. 26-33, jan./jun. 2005, p. 28.

<sup>55</sup> CAMPOS, Augusto. What is free software. *BR-Linux*. Florianópolis, March 2006, p. 1-2.

<sup>56</sup> MAIA, Caio Cezar V. The differences between free and free software. *Annals of the National Congress on University, Distance Learning and Free Software*, Minas Gerais, v. 2, ed. 2, p. 1-2. Available at: <http://www.textolivres.pro.br/blog/?p=1789>. Accessed on: 25 set. 2023.



On the other hand, free software, as already discussed, is more comprehensive and involves a series of requirements and characteristics related to freedom. When software is created, it must be accompanied by a document called a software license, which determines what actions the user is authorized to perform or not<sup>57</sup>.

With regard to educational software, it is created in different categories (free or proprietary software) to be used in the educational process, being characterized as educational when inserted in teaching-learning contexts. Therefore, programs used in school administrative processes or in pedagogical contexts are considered educational software, being categorized as educational software and application software<sup>58</sup>.

It is also important to highlight the close relationship between free software and the digital inclusion initiative, especially in the Brazilian context. The recent national decision to use this program in all schools and public establishments is quite significant, because, in addition to having economic impacts, this public policy can promote profound cultural and ideological changes, contributing to break with the symbolic power attributed to the market, which mischaracterizes the national territory and produces a configuration of non-places<sup>59</sup>.

From this point of view, digital inclusion is predominantly a process of authorship and collaboration, of creating meanings and senses, making the internet a natural environment for communication, exchange of information and construction of knowledge. Therefore, disassociating free software and its philosophy from digital inclusion actions represents, in addition to theoretical and conceptual incongruity, a choice opposed to the national option potentially aimed at creating a culture of collaboration, communication, exercise of citizenship and democratization of knowledge<sup>60</sup>.

Regarding this point, Amartya Sen exposes that the growth of the "capacities" of individuals can be expanded through public policies, but, on the other hand, the direction of these public policies can be influenced by the effective use of the participatory capacities of the people, so that one would be faced with a two-way relationship<sup>61</sup>.

Assuming the commitment to promote digital inclusion with an approach different from the typical passive reproduction observed, we advocate here the creation of public policies and programs

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<sup>57</sup> MAIA, Caio Cezar V. The differences between free and free software. *Annals of the National Congress on University, Distance Learning and Free Software, Minas Gerais*, v. 2, ed. 2, p. 1-2.

<sup>58</sup> MORAIS, Rommel Xenofonte Teles de. Educational software: the importance of its evaluation and its use in classrooms. Advisor: Antonio Luiz de Oliveira Barreto. 2002, 52 p. Graduation paper (Bachelor's Degree in Computer Science) - Faculdade Lourenço Filho, Fortaleza, 2003, p. 21. Available at: <https://docplayer.com.br/90886-Software-educacional-a-importancia-de-sua-avaliacao-e-do-seu-uso-nas-salas-de-aula.html>. Accessed on: 25 set. 2023.

<sup>59</sup> SERPA, Felipe. Digital draft: dialogues with Felipe Serpa. 1. ed. Salvador: EDUFBA, 2011, 320p, p. 147. Available at: <http://repositorio.ufba.br/ri/handle/ri/14783>. Accessed on: 25 set. 2023.

<sup>60</sup> For more information, see: CORREA, Doutor Paulo. S. de Almeida; VIEIRA DE ABREU, Joniel. Enforceability of the right to education in the face of the constitutional principles of equality and difference. *Journal of Fundamental Rights & Democracy, [S. l.]*, v. 28, n. 1, p. 197–226, 2023. DOI: 10.25192/issn.1982-0496.rdfd.v28i12495. Available at: <https://revistaeletronicardfd.unibrasil.com.br/index.php/rdfd/article/view/2495>. Accessed on: 27 set. 2023.

<sup>61</sup> SEN, Amartya. *Development as freedom*. São Paulo: Companhia das Letras, 2010. 461 p, p. 33. ISBN 97835916461.



for digital inclusion, using information and communication technologies for the area of education, promoting the expansion of access to the internet and encouraging the use of free software in public schools. in order to stimulate knowledge, reduce inequalities and promote democracy.

In this sense, the computer brings the motivating element to all those involved in the educational process. The student, one of the protagonists of this relationship, has autonomy, becoming more creative, in addition to collaborating with intellectual and cognitive development, stimulating logical reasoning and the ability to find solutions to problems<sup>62</sup>. The use of technologies is of fundamental importance to favor the interaction and relationship between teachers and students, aiming to obtain the most productive results possible in the learning process<sup>63</sup>.

A standout feature is that no matter which free software you choose, it can be customized to meet the user's needs. In this way, a school can adopt any option and customize it according to its interests, allowing it to have versions adapted to each grade, effectively achieving the desired objectives. It's important to note that proprietary software doesn't offer that much customization power, and even if it does, it will always be included in the price of the software and/or its license.

The choice to use free software offers the possibility of transforming not only the relationships between teachers and students in schools, but can also bring important implications in the formation of free individuals, in addition to promoting the inclusion and protection of fundamental values in a society that produces and shares technological knowledge, because according to Marx, "The mode of production of material life conditions the process of social, political and intellectual life."<sup>64</sup>

When considering the choice of free software in education, it is important to understand the arguments that support this choice. In this sense, Freire and Passeti point out that "when the educator is told how to make a table technically and the aesthetic dimensions of how to make it are not discussed, the capacity of the educator to know epistemological curiosity is castrated".<sup>65</sup>

To analyze the arguments in favor of the option for free software, the studies of Sérgio Silveira<sup>66</sup> and Anderson Alencar will be used<sup>67</sup>, establishing relationships between the five arguments

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<sup>62</sup> SANTOS, Luiz Cláudio Machado dos. Educational software with augmented reality to mediate the learning of deaf children who use books and Portuguese. 1. ed. Curitiba: Appris, 2020, 245p, p. 36.

<sup>63</sup> SANTOS, Luiz Cláudio Machado dos. Educational software with augmented reality to mediate the learning of deaf children who use books and Portuguese. 1. ed. Curitiba: Appris, 2020, 245p, p. 36-37.

<sup>64</sup> MARX, Karl. Contribution to the Critique of Political Economy. 2. ed. São Paulo: Editora Expressão Popular, 2008, 288p, p. 47.

<sup>65</sup> FREIRE, Paulo; PASSETTI, Edson. Libertarian Conversation with Paulo Freire. São Paulo: Imaginário, 1998, 120 p, p. 87.

<sup>66</sup> SILVEIRA, Sérgio Amadeu da. Free software: the struggle for the freedom of knowledge. 1. ed. São Paulo: Editora Fundação Perseu Abramo, 2004. 82 p.

<sup>67</sup> ALENCAR, Anderson Fernandes de. The pedagogy of migration from proprietary to free software: a Freirean perspective. Advisor: Moacir Gadotti. 2007. 246 p. Master's Thesis (Master in Education) - University of São Paulo, São Paulo, 2007. Available at: <https://www.teses.usp.br/teses/disponiveis/48/48134/tde-08112007-150130/publico/DissertacaoAndersonAlencar.pdf>. Accessed on: 27 set. 2023.



proposed by the first for this adoption by the federal government, and the three categories of reasons for its use suggested by the second, which are of a philosophical, technological and economic nature.

Presenting in his fifth chapter the "reasons for the country to adopt free software", Silveira summarizes this choice in the arguments of a macroeconomic nature, security, technological autonomy, independence of suppliers and democracy. The macroeconomic issue, related to the reduction of costs for the payment of licenses, is an initial argument that should be considered when opting for the use of free software<sup>68</sup>.

Related to this argument, Alencar expands the economic reasons beyond the simple expense of paying for licenses, since he emphasizes that the user of free software is not restricted to a single supplier or to market pressures based on profit<sup>69</sup>. These reasons are also addressed in Silveira's fourth argument, which points out that the choice of free software increases the independence of suppliers, avoiding being tied to a single company that develops the software<sup>70</sup>.

The second argument proposed by Silveira is the issue of security, which, according to Alencar's categorization, falls within the technical reasons. This argument is based on the user's permission to analyze the software code and modify it for greater security<sup>71</sup>. The reason in question is what ensures the third argument proposed by Silveira about the technological autonomy of free software, which expands the country's possibilities of also becoming a developer and not just a mere consumer of technologies<sup>72</sup>.

Silveira's last argument portrays his democratic perspective, because as information and communication technologies are consolidated as means of expression of knowledge, culture and economic transactions, the decisions contained in software must be shared and collective<sup>73</sup>.

Among the philosophical arguments presented by Alencar, the first refers to the principles of free software as a return to the collaborative origins of software development, based on the "ideals of democratization of knowledge and access, the sharing of cultural goods, of any and all knowledge/knowledge produced by human beings".<sup>74</sup>

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<sup>68</sup> SILVIRA, Sérgio Amadeu da. Free software: the struggle for the freedom of knowledge. 1. ed. São Paulo: Editora Fundação Perseu Abramo, 2004, p. 38-39.

<sup>69</sup> ALNCAR, Anderson Fernandes de. The pedagogy of migration from proprietary to free software: a Freirean perspective. Advisor: Moacir Gadotti. Master's Dissertation (Master in Education) - University of São Paulo, São Paulo, 2007, p. 73.

<sup>70</sup> SILVEIRA, Sérgio Amadeu da. Software livre: a luta pela liberdade do conhecimento. 1. ed. São Paulo: Editora Fundação Perseu Abramo, 2004, p. 40.

<sup>71</sup> ALENCAR, Anderson Fernandes de. A pedagogia da migração do software proprietário para o livre: uma perspectiva freiriana. Orientador: Moacir Gadotti. Dissertação de Mestrado (Mestre em Educação) - Universidade de São Paulo, São Paulo, 2007, p. 73.

<sup>72</sup> SILVEIRA, Sérgio Amadeu da. Software livre: a luta pela liberdade do conhecimento. 1. ed. São Paulo: Editora Fundação Perseu Abramo, 2004, p. 40.

<sup>73</sup> SILVEIRA, Sérgio Amadeu da. Software livre: a luta pela liberdade do conhecimento. 1. ed. São Paulo: Editora Fundação Perseu Abramo, 2004, p. 42.

<sup>74</sup> ALENCAR, Anderson Fernandes de. A pedagogia da migração do software proprietário para o livre: uma perspectiva freiriana. Orientador: Moacir Gadotti. 2007. 246 p. Dissertação de Mestrado (Mestre em Educação) - Universidade de São Paulo, São Paulo, 2007, p. 65



All the opportunities that free software in the field of education offers do not come only from the resources themselves. It is through the presence of the teacher as a mediator and encourager of learning that this process becomes meaningful, in such a way that software alone does not promote learning, it organizes thought, but the pedagogical role of the teacher becomes essential and gains a new meaning in this social context permeated by new technologies and information.

In summary, free educational software is a valuable resource in the classroom, creating a more dynamic, adaptable and interactive learning environment, and contributing to the development of various skills and student engagement. By integrating these tools properly, teachers can promote more effective education, preparing students to meet the challenges of contemporary society.

## **FINAL THOUGHTS**

With educational programs, education acquires new tools that aid the learning process. The role of the teacher does not disappear, but gains a new interpretation: that of a mediator who guides, intervenes pedagogically, challenges and motivates the student to venture into the search for knowledge. It is necessary to emphasize that educational programs should be used in a complementary and integrated way with conventional pedagogical practices, so that they should not replace the role of the teacher, but should be tools that improve teaching and learning.

In addition, in order for the free software used in education to promote innovative and significant attitudes for both the mediator and the students, it is essential that the educator plans properly, having clear educational objectives, knowing the program to be applied and pedagogically planning educational practices. It is essential that the teacher makes an appropriate choice based on the learning objectives and good planning, creating situations that allow the student to think critically, develop hypotheses and problematize the data, recreating situations that favor the construction of knowledge.

Considering this situation and the need to rethink education for today's society, it is necessary for the government to incorporate new practices and solutions, aiming to promote the digital inclusion of children and adolescents who do not have access to quality education. In addition, it is essential to provide public schools with new teaching methods and programs, which can be through free educational software, together with government support, so that students have access to modern technological resources.



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