EDUCATION, TECHNOLOGY AND INNOVATION POLICIES: CONTRIBUTIONS TO THE EMANCIPATORY USE OF TECHNOLOGIES

POLÍTICAS DE EDUCAÇÃO, TECNOLOGIA E INOVAÇÃO: CONTRIBUIÇÕES PARA USO EMANCIPATÓRIO DAS TECNOLOGIAS

POLÍTICAS DE EDUCACIÓN, TECNOLOGÍAS E INNOVACIÓN: CONTRIBUCIONES PARA EL USO EMANCIPATORIO DE LAS TECNOLOGÍAS

Raquel Aparecida SOUZA[1]
Raquel de ALMEIDA MORAES[2]

ABSTRACT: The purpose of this essay is to promote a critical theoretical discussion with a view to raising elements to understand the discourses of public education policies on the axes of technology and innovation in order to apprehend their meanings. Based on the philosophical perspective of materialism-dialectical as to the method, it uses the analysis of Fiorin's discourse to apprehend the discursive meanings. As a result, these discourses express at least three meanings: economist view of education, technology and innovation; learn to learn; exclusion vs. competition. As a final consideration, on the other hand, it is urgent to use technologies in search of the construction and consolidation of a more critical, emancipatory education based on the perspective of solidary technoscience.

KEYWORDS: Policies and education. Technology and innovation. Solidary technoscience.

RESUMO: *O objetivo do texto é tecer uma discussão teórica à luz de referenciais sobre estudos relacionados a políticas de educação, tecnologia e inovação, no sentido de apreender elementos que demarquem possibilidades para o uso emancipatório das tecnologias na educação. O estudo foi fundamentado na perspectiva filosófica do materialismo-dialético; quanto ao método, pautando-se na pesquisa bibliográfica. Foi possível compreender, entre outras questões, que se faz necessário políticas e ações educativas que caminhem na contramão dos ideais impostos apenas pelo sistema capitalista, de modo a se obter a construção e consolidação de uma educação mais crítica, emancipadora, a qual pode estar fundamentada na perspectiva da utilização de tecnologias como forças produtivas de modo solidário.*

PALAVRAS-CHAVE: *Políticas e educação. Tecnologia e inovação. Abordagem sociotécnica.*

[1] Federal University of Uberlândia (UFU), Uberlândia – MG – Brazil. Adjunct Professor. Doctorate in Education from the University of Brasília (UNB) - Education Policies Line. ORCID: https://orcid.org/0000-0001-5906-0671. E-mail: eraquelas@gmail.com
[2] University of Brasília (UnB), Brasília – DF – Brazil. Full Professor. Department of Planning and Administration (FE/UNB). Doctorate in Education (UNICAMP). ORCID: https://orcid.org/0000-0001-7842-395X. E-mail: rachel@unb.br

RESUMEN*: El propósito del texto es promover una discusión teórica crítica con miras a plantear elementos para comprender los discursos de las políticas públicas de educación en los ejes de la tecnología y la innovación con el fin de aprehender sus significados. Partiendo de la perspectiva filosófica del materialismo-dialéctica en cuanto al método, utiliza el análisis del discurso de Fiorin para aprehender los significados discursivos. Como resultado, estos discursos expresan al menos tres significados: visión economista de la educación, la tecnología y la innovación; aprender a aprender; exclusión vs. competencia. Como consideración final, por otro lado, es urgente utilizar tecnologías en busca de la construcción y consolidación de una educación más crítica y emancipadora basada en la perspectiva de la tecnociencia solidaria.*

PALABRAS CLAVE*: Políticas y educación. Tecnología e innovación. Abordaje sociotécnica.*

Initial Issues

The incentive for the use and insertion of technologies in education is on the agenda of many governments in Brazil, however, we still do not have well consolidated public policies on this subject. With the situation of social isolation and the suspension of face-to-face classes, as a preventive measure against the spread of the Covid-19 Pandemic, many basic and higher education institutions in Brazil have decided to offer classes in a non-face-to-face manner, using digital technologies, and have encountered many challenges.

Before the Pandemic, several studies and researches have already shown some results about policies and actions for the insertion of technologies in education, and in terms of educational policies, we have a series of governmental proposals that have already been implemented, but have not been continued, among which we highlight those that emphasize innovation in education through the use of technologies.

Thus, it becomes important to put on the agenda discussions related to these themes in order to understand, among other issues, how it is possible to innovate towards the emancipation of pedagogical practices using digital technologies in a creative and critical way, opposing a hegemonic reproductive and capitalist vision.

According to Saviani (2013), in a democratic perspective "education, besides constituting a certain type of right, the social right, is configured as a necessary condition, although not sufficient, for the exercise of all rights, whether civil, political, social, economic or of any other nature" (p. 745).

For the author, the exercise of rights of all kinds presupposes access to written codes. "This is why this same type of society erected the school as the main and dominant form of

education and advocated the universalization of elementary school as a way to convert all individuals into citizens, that is, into subjects of rights and duties" (SAVIANI, 2013, p. 745).

It is understood that issues related to innovation and the insertion of technologies need to be connected to the social role of education, which involves the possibilities of providing adequate access and appropriation of the various knowledge historically produced by individuals; in this sense, the terms "technology and innovation" cannot be understood only in one perspective.

Several governmental actions and policies for the insertion of technologies in Brazilian education present, in their speeches, the possibilities of transformation of educational practices in an almost automatic perspective, conceiving technologies either as deterministic techniques or as neutral instruments. However, contrary to these visions, we corroborate Peixoto (2015), who points out that technologies can be integrated into pedagogical activities critically and through democratic choices of the subjects.

The research is based on the materialist-dialectical approach to the method, which, according to Marcondes (2004), stands out for the critical initiative of modern thought, through the contributions of Marx, initiated by Descartes and followed by Bacon, Kant, and Hegel.

In this perspective, the research was based on theoretical analysis from bibliographic research, seeking dialogue with important critical references to assist in understanding the study proposal.

The bibliographical research is a fundamental step in the investigative process because, among other possibilities, it allows to apprehend the meanings of the discourse through comparative analysis, as highlighted by Fiorin (2005) and Moraes (2014), from the development of arguments and critical hypotheses.

We sought to answer the following questions: what are the possibilities for the emancipatory use of technologies in education? Is it possible to innovate towards the emancipation of pedagogical practices using digital technologies in a creative and critical way, opposing a hegemonic reproductive and capitalist vision? Thus, the general objective was to weave a theoretical discussion in the light of critical references about education, technology, and innovation policies, in order to apprehend elements that demarcate possibilities of the emancipatory use of technologies in education.

Technology, innovation and the capitalist contexto

The "technique" with a "know-how" character predominated until the advent of the Industrial Revolution, in the eighteenth century, being transmitted from generation to generation. With the advent of the new phase of capitalism, Marx (2001) points out that the principles of science were incorporated to technique, in turn transforming it into technology. The traditional instruments of work were transformed into machines, changing and adapting themselves to the capitalist mode of production.

The technological advance and its implications on the way the labor market works leads society, according to Antunes (1995), to an intensification of worker exploitation, favoring the proliferation of outsourced, partial and precarious work, without rights and underpaid, strengthening the dual labor market. And about today's informational financial capitalism, Antunes (2018) argues that instead of the end of work, there is a new proletariat of the digital age, whose jobs, now intermittent and more or less constant, have gained new momentum with Information and Communication Technologies (ICTs), by connecting workers to various applications and mobile devices in real time, for long hours of their day, without rest, generating a new type of digital slavery in the middle of the 21st century.

For some critical theorists, the discourse that advocates an increasing qualification of the workforce is a myth that is part of and supports the maintenance of a production model that preserves, in its entirety, the fetishism of the commodity and alienation. In the contemporary context of the accelerated degradation and precariousness of work, Dal Rosso (2008) warns that "if work was born as a vital activity, essential for the realization of human life, capitalism has subjected labor activity to the imperatives of second nature, as Marx says, to the constraints of money, market and capital." (DAL ROSSO, 2008, p. 1).

In turn, "innovation" has been a term that has appeared as a synonym for technology or as something that is determined by technology, that is, the adoption of technology in education, for example, can be understood by the rule of use to reach innovation. Considering the purposes of the capitalist model in force in Brazil and in the world, it is understandable to understand, as Dagnino (2014) points out, that:

> The concept of innovation was coined in the context of advanced capitalism countries to designate a set of activities that encompasses everything from Research and Development (R&D) to new marketing techniques (through the introduction of new methods of labor force management) that aims to improve the condition of a company in the face of intercapitalist competition and not to promote "social welfare" (p. 133).

Dagnino (2019) argues that in Brazil, innovative companies prefer to import the technology the country needs to offer here what was already produced in northern countries. "Of the 90,000 masters and doctors who were trained between 2006 and 2008 (years of economic bonanza) to do research and development in companies, only 68 were hired by them." (DAGNINO, 2019, p. 28)

In his view, most people who fall under the political left perspective and who are part of the research community in Brazil have not been able to realize that the global techno-scientific dynamics (or those of global companies) are contaminated with the viruses of programmed deterioration, planned obsolescence, exacerbated consumerism, and socio-environmental degradation. Thus, the author sentences four norms of conduct-"scientism, productivism, innovationism, and entrepreneurship-that the elite impose in order to keep up with the techno-scientific dynamics led by multinationals" (DAGNINO, 2019, p. 29).

In this sense, even having this theoretical framework, Dagnino (2014) points out the need for a non-capitalist approach to the concept of technology and innovation in search of a "Social Technology (or Innovation)". This would require a "conceptual turn: a profound revision of concepts such as 'technology' and 'innovation' seems necessary. A revision that has as its center the understanding of the social relations that are at the root of what is currently alluded to with these concepts" (DAGNINO, 2014, p. 136).

In the educational field, Saviani (2005) highlights that alienation is present in material labor, since the product of labor is separated from the worker. Regarding non-material labor, Saviani theorizes the existence of two types, the first consisting in the fact that the product is separated from the producer, and highlights as an example the production of books. The second type occurs when the product is not separated from the worker, and an example is the teacher, relating education to educational work. In this case, Saviani (2005) states that education is not limited to teaching, "it is certain, however, that teaching is education" (p. 12).

Returning to the contributions of Marx and Engels (1986), Saviani (2005) proposes a non-alienating technological education of the polytechnic type that reveals the non-human character of technologies, highlighting the need to explain the scientific and technological principles that originate them. For him, technologies are means and cannot be fetishized under the risk of alienating the teacher's work, which is not material, as occurs in some distance learning courses currently practiced.

And what does the creator of online education think? For Feenberg (2010, p. 167), "technologies are not just means that lead to ends; they also shape worlds." And he asks, "What kind of world is instituted by the Internet?" In doing so, he criticizes the model he calls the

Factory, which consists of automated teaching machines or poor copies of face-to-face classrooms as opposed to the "city model", which has the challenge of using electronic networks in such a way that they are appropriated by educational institutions in a dialogical way.

Also, from Dagnino's (2019) perspective, to emancipate the relationship between technology and innovation in the capitalist context, which has produced technoscience in favor of capital, it would be opportune for technoscience in solidarity as:

> [...] the cognitive result of the action of a collective of producers on a work process that, in function of a socioeconomic context (which engenders the collective private property of the means of production) and of a social agreement (which legitimates the associativism) that gives rise, in the productive environment, to a control (self-management) and a cooperation (of a voluntary and participative type) that causes a modification in the generated product whose material result can be appropriated according to the decision of the collective (solidarity enterprise) (p. 62).

This perspective of solidary technoscience that recognizes the origin of technology in the capitalist context points out possibilities that the product can be modified by cooperation and participation and, in turn, can also be appropriated from the emancipatory decisions developed by the collective of participation.

Government policies and programs: innovation and technology in education

As regards the policies for the insertion and use of technologies in Brazil, studies indicate that many of them go through political and economic interests, and follow an international and economic orientation for education. Some actions and educational policies of governments for the insertion of technologies accompany the movement for the implementation of distance learning (DL) in Brazil, especially from 1978 on, such as the programs that used television and printed material, especially the *Telecurso 2º grau* (1978), *Telecurso 1º grau* (1981), and the Educom Program (1980).

As of the 1990s, the most incisive practices of investments to innovation fostering policies appear, as highlighted in Law No. 10.973, of December 2, 2004 - Innovation Law (BRAZIL, 2004), amended by Law No. 13.243/2016 (BRAZIL, 2016), "which began to allow public spaces to be business incubators, allowing public and private resources to be shared, in addition to the creation of funding funds and the granting of tax incentives" (ECHALAR; LIMA; OLIVERIA, 2020, p. 870).

More specifically considering the incentive for computer and internet use, Cruz and Lima (2019) highlight the period after 1996, with the creation of the Distance Education

Secretariat and the approval of the Law of Directives and Bases of Education, LDB n.9394 /96, which recognized DL as a teaching modality, and from this context, several educational institutions began to propose distance courses through the use of technologies, strengthening the actions to expand this modality and expanding the insertion of technologies, such as the creation of the National Program of Informatics in Education (PROINFO/1997), the proposition of Educational Technology Centers (NTE) and the incentive to make computers available in public schools.

Among other policies and actions in the period after LDB/96 and approval of the National Education Plan (PNE) of (2001-2011), DL presents itself as a strategy for democratization of access to education; about this, Cruz and Lima (2019) point out that the Brazilian government of the time promotes several attempts to intensify and consolidate distance education in Brazil, and along with it the mechanisms and discourses of innovation and incentive for the use of technologies in education, from various laws, resolutions, ordinances and decrees. The authors highlight the proposition of several continuing education courses and initial training, specialization, extension, and improvement courses, among them: the School Leadership Training Program (Progestão/2003); *Gestar II* Continuing Education (2004); *Prolicenciatura* (2004); *Mídias na Educação* (2005); *Proinfantil* (2005); *Proletramento* (2005), and the National School of Managers Program (2005).

Other actions that also mark the discourses about the incentive for innovation and the use of technologies in the educational environment are programs such as the Open University (UAB/2006); e-Tec Brazil Network (2007); ProInfo Integrated (2007); National Plan for Basic Education Teacher Training (PARFOR/2009); Broadband in Schools Program (2008); One Computer per Student Program (Prouca/2009); National Education Plan (PNE/2014-2014); Connected Education Innovation Program (2017) and Connected Innovation Policy (2019).

Considering the PNE of (2014-2024), Heinsfeld and Pischetola (2019) highlight that technologies are pointed out in that plan as "strategic tools to achieve the goals outlined for the program" (p. 14). In this perspective, one does not notice a concern for the critical and reflexive encouragement of technologies, since the PNE proposes "computerization and access to digital equipment as a sufficient condition to ensure improvements in the educational system" (p. 14).

Another government action is the Connected Education Innovation Program, which was created in 2017 and transformed into a Policy through Law No. 14,180 in 2021. It aims to "support the universalization of access to high-speed internet and foster the pedagogical use of digital technologies in Basic Education" (EDUCAÇÃO CONECTADA, MEC, 2017).

According to data published by the Ministry of Education's Connected Education website (MEC, 2017), this Policy has four dimensions, allocated among vision, training, digital educational resources, and infrastructure, seeking to foster the preparation of schools and education professionals to implement digital technologies.

Regarding this Program, Echalar and Lima (2018) point out that there is a concern to "measure the nuances about what it means to innovate pedagogically and the pedagogical use of digital technologies" (p. 14). For the authors, this understanding means reducing the educational process to the quantitative scope:

> [...] having as object to be measured the external and observable dimensions of the complex social relations in the school context. [...] As already emphasized, it is possible to look at this publication proposal under two antagonistic optics: as a proposal for guidance and incentive to critical analysis made by professionals involved in the teaching and learning process or as a possibility of restriction of what is interpreted as acceptable and desirable use of these technologies in the school context.(ECHALAR; LIMA, 2018, p. 14)

This brief review highlights some government policies and actions in Brazil from the viewpoints of researchers who seek to understand the real interests regarding the incentive for the insertion of technologies in education, and shows different ways of seeing the world through specific views.

Pedagogical emancipation using technologies in a critical way

Beyond the speeches expressed in the actions and policies of governments that promote the ideals to encourage the insertion of technologies in education, among which we highlight those that are linked to the search for pedagogical innovation, it is necessary to be clear about the ideological positions of the enunciators of these speeches. In other words, it is necessary to understand the historical, social, and political relations in which the policy makers are inserted, considering the world and educational visions that they defend, and it is necessary to raise elements that help for a critical evaluation and for emancipatory decision-making, as Fiorin (2007) points out, because a social formation has several class fractions, and to each one of them corresponds an ideological formation and a discursive formation.

Considering the historical and political period in Brazil from the governments of Fernando Collor (1989) and Fernando Henrique Cardoso (1995) to the present day, in the government of Jair Bolsonaro (2021), one can see that the way the government representatives

perceive the world and conceive their actions is intrinsically linked to a macro project of neoliberal capitalism, which is supported by international entities and organizations. These, in turn, present discourses that education has a strategic role for the development of the country; however, the interests are based on the formation of individuals capable of conforming to the capitalist ideals of production.

The discourses also point to the possibilities for schools to innovate their pedagogical practices using digital technologies. In this sense, it is necessary to advance the discussions around these ideals, in order to obtain elements that can contribute to the understanding and overcoming of the conformist discourses of technologies as answers only to the desires of capitalism, which reinforce the technological fetishism or that propose and promote actions and programs for practices with technologies in a passive way.

Some government actions and policies concentrate expectations around at least two extremist views that are dichotomous, as Peixoto (2012) points out, which are sometimes directed towards a *technological determinism* in which technologies would be autonomous entities and determinants of social processes, and sometimes they are directed towards an instrumental view, that is, technologies are at the service of human will, but both views hide the human dimension of the object.

However, Peixoto (2012, 2015), Souza and Moares (2018), Echalar, Sousa, and Filho (2020), among others, point out that it is possible to move away from these extremist and discursive views on technology and move towards a more critical view, which understands it as a cultural artifact from a more supportive or sociotechnical approach, "for the critical and contextualized understanding of the relationships between technologies and society" (PEIXOTO, 2012, p. 2).

> The sociotechnical approach, adopted as a reference for research in education, implies a dynamic in which the focus shifts dialectically between technique and social subjects. This implies the development or adaptation of procedures that allow capturing the technical instrumentality, in addition to "seeing and listening" to social subjects (PEIXOTO, 2012, p. 7).

This view criticizes the insertion and use of technologies in education when conceived in the two extremist views. In the determinist logic, "technology determines the effects that it induces in society" (PEIXOTO, 2012, p. 3), that is, technology would have the ability to dictate behaviors and make cultural and social changes from a technical and scientific progress and, in this perspective, the simple fact of the insertion of technology in education would already mean changes, innovations, and therefore the expected quality.

In the vision in which technology is conceived only as an instrumental device, relationships are determined by the uses that are made of them, considering the objects as neutral: "In this case, teachers and students are entirely responsible for the uses that they make of the computer and the Internet. Technological media are instruments that can be entirely shaped by their users." (PEIXOTO, 2012, p. 5)

Echalar, Sousa, and Filho (2020) point out the assumption that instrumental rationality cannot explain the appropriation of technology objectified in the teacher's work, because "the use of technology by subjects, even taking into account the immediate aspects of their social context, does not cover the complexity of technology in the mediation of the teaching work" (p. 20).

In 2004, Lima pointed out that many individuals who start using technology in their teaching practices are convinced that, just by using it, they are already innovating the teaching process, an aspect that has also been the focus of many government policy speeches. However, he reminds us that teachers can advance this thinking and seek the construction of solidary and critical knowledge, using technologies, but aiming at the consolidation of an emancipating and transforming education as a society project.

Mallamann and Shneider (2021) point out that there are common discourses that:

> [...] are the data referring to the lack of conditions and infrastructure. In this perspective, unsuspecting consumers assume and favor naïve positions that tarnish the interactive, collaborative, and humanizing potential of education mediated by technologies. It is worth emphasizing that the universality of the right to education, the democratization of knowledge, and lifelong learning go through access and active participation, co-producing life mediated by technologies (p. 5).

In summary, there are two directions, two orientations in education and technology policies. According to Saviani (2007), from 1969 to 2001, there was a predominance of productivist pedagogy. From 1969 to 1980 there was a predominance of a technicist pedagogy based on the Theory of Human Capital. Therefore, technology was loaded with these ideological meanings.

After a fruitful moment of democratization of the Brazilian society that occurred between 1980 and 1990, there was a predominance of productivist pedagogy, in which the predominant value is given by the market and technology is perceived as synonymous with innovation and flexibility. Therefore, it is aimed at the reproduction of the capital, generation and expansion of surplus value and, as it was pointed out, the exploitation of the worker, especially in times of Pandemic, with the increasing loss of rights.

Understanding and reflecting about the educational practices from the social and historical context of the class in which the individual is inserted becomes a central issue to be clear about the understanding of the world and of education that one has and wants to achieve. For this assumption, education is conceived as a democratic practice, since it is corroborated by Paro (2002), Duarte (2008), and Saviani (1989) that it is through social practice that there is the appropriation of knowledge historically produced by men. In this sense, "education is a specifically human activity whose origin coincides with the origin of man himself and, therefore, should be thought and developed from the perspective of human and intellectual emancipation" (SOUZA; MORAES, 2018, p. 462).

It is in this understanding of education, in its broadest dimension, that it is also understood that the insertion of technologies, both in policies and in pedagogical practices, should be understood as an intrinsic element of the right to education. In other words, using technology should also start from conscious choices, considering that it is part of human culture and can contribute to the process of building the human and historical subject.

When making this movement of reflection, the dialogue perspective becomes important, as proposed by Lima (2004) based on Paulo Freire's model, in which, as interlocutor subjects, it is necessary to seek the "meaning of the meanings". Thus, it is possible to find meaning about why or what for one can use technologies in pedagogical practices and, at the same time, advance towards the construction of a critical education that denies the mere transference of knowledge, which imposes the necessity of using technologies in education, separating the human dimension.

From this perspective, it is understood that technologies are loaded with values and, therefore, they neither determine nor are only shaped by the users, but become effective from the intentionality of the work. In the case of education, the teaching work is articulated to the critical, political, and dialectical historicity of the capitalist system, but it cannot respond only to its interests. Thus, technologies can be integrated in order to emancipate the pedagogical activities, contributing to the construction of a critical education, in a de-alienated and decoded way, through democratic choices of the subjects in the process of teaching and learning (PEIXOTO, 2015).

Final remarks

The study had as a general objective to weave a theoretical discussion in the light of critical references about studies related to education, technology and innovation policies, in order to apprehend elements that demarcate possibilities of the emancipatory use of technologies in education.

Studies and academic research that seek to understand the real interests of government actions and programs for the insertion of technologies in education point to the relationship with pedagogical innovation, and often follow international guidelines and interests, highlighting that countries on the rise have shown better results in the economy when they invest in education through digital inclusion, technological innovation for pedagogical practices.

These visions follow conceptions aligned to a world and capital project that seeks, through education, opportunities and spaces to meet demands related to labor productivity, to the needs of workforce training for the market, and to the strengthening of the economic growth required by the current capitalism model.

These principles denote proposals that consider that investments and support for the use of technologies in education will be able to solve problems regarding quality, access, and permanence in schools. In this perspective, the insertion of technologies can be used as a means of "legitimizing the notorious forms of social stratification and division. This has justified the control exercised by the State in several education programs and policies. (PEIXOTO; ECHALAR, 2017).

These conceptions appear in results of studies that predate the context of the Covid-19 Pandemic. Considering the various challenges of education in the current pandemic conjuncture, in which school institutions have started to use technologies in their pedagogical practices, several other questions arise; among them stand out: are we willing to dialogue and advance to understand the "signification of meanings" of using technologies in search of the construction and consolidation of a more critical and emancipating education? Or will we be convinced to believe that we are part of a new proletariat of the digital age of capital and that we will contribute to a generation that can lead to a digital slavery with the use of technologies in pedagogical practices?

From the established dialogues, it is evident that we have, *on one hand*, the contradiction of alienation, of intensified work, favoring the proliferation of outsourced, partial and

precarious jobs, in which the use of technology is necessary, because it either determines the means or can be molded to do so, strengthening the dual labor market.

But, *on the other hand*, there is the possibility of using technologies as productive forces in a solidary way, in which one can express a communication that opposes the social division of capitalist labor towards the construction of a critical historical education and the "paradigm of the City and not the Factory", as Feenberg (2010) pointed out, through critical and democratic choices of the subjects. It is understood that this perspective demarcates possibilities for the emancipatory use of technologies in education, since, in a more critical view, it understands technology as a cultural artifact from a more supportive or sociotechnical approach.

REFERENCES

ANTUNES, R. **Adeus ao Trabalho?** Ensaio sobre as metamorfoses e a centralidade do mundo do trabalho. São Paulo: Cortez, 1995.

ANTUNES, R. **O privilégio da escravidão**: o novo proletariado de serviço na era digital. São Paulo: Boitempo, 2018.

BRAZIL. **Lei n. 10.973, de 2 de dezembro de 2004**. Dispõe sobre incentivos à inovação e à pesquisa científica e tecnológica no ambiente produtivo e dá outras providências. Brasília, DF: Presidência da República, 2004. Available at: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.973.htm. Accessed on: 08 May 2021.

BRAZIL **Lei n. 13.243, DE 11 de janeiro de 2016**. Dispõe sobre estímulos ao desenvolvimento científico, à pesquisa, à capacitação científica e tecnológica e à inovação e altera a Lei nº 10.973, de 2 de dezembro de 2004 [...]. Brasília, DF: Presidência da República, 2016. Available at: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/lei/l13243.htm. Accessed on: 26 June. 2021.

BRAZIL. **Programa de Inovação Educação Conectada**. Brasília, DF: MEC, SEB, 2017. Available at: http://portal.mec.gov.br/docman/novembro-2017-pdf/77471-diretrizes-e-criterios-do-programa-de-inovacao-educacao-conectada-pdf/file. Accessed on: 08 Mar. 2021.

CRUZ, J. R.; LIMA, D. C. B. P. Trajetória da educação a distância no Brasil: políticas, programas e ações nos últimos 40 anos. **Jornal de Políticas Educacionais**, v. 13, n. 13, p. 1-19, 2019. Available at: https://revistas.ufpr.br/jpe/article/view/64564. Accessed on: 10 Aug. 2021.

DAGNINO. R. Em direção a uma teoria crítica da tecnologia. *In:* DAGNINO, R. **Tecnologia Social**: contribuições conceituais e metodológicas. Campina Grande: EDUEPB, 2014. p. 113-152. Available at: http://books.scielo.org/id/7hbdt/pdf/dagnino-9788578793272-07.pdf. Accessed on: 05 Feb. 2021.

DAGNINO. R. **Tecnociência solidária**. Um manual estratégico. Marília: Lutas Anticapital, 2019.

DAL ROSSO, S. **Mais trabalho!**: a intensificação do labor na sociedade contemporânea. São Paulo: Boitempo, 2008.

DUARTE, N. **Sociedade do Conhecimento ou Sociedade das Ilusões?** Campinas, SP: Autores Associados, 2008.

ECHALAR, J. D.; LIMA, D. C. B. P. Um panorama das pesquisas sobre políticas públicas para a inserção de tecnologias digitais na educação. **Imagens da Educação**, v. 8, n. 1, p. 1-17, 2018. Available at: http://periodicos.uem.br/ojs/index.php/ImagensEduc/article/view/40283 Accessed on: 07 June.2020.

ECHALAR, A. D. L. F.; SOUSA, D. R.; FILHO, M. A. Fundamentos Teóricos e Epistemológicos da Pesquisa. *In:* ECHALAR, J. D.; PEIXOTO, J.; FILHO, M. A. A. **Trajetórias:** apropriação de tecnologias por professores da educação básica pública. Ijuí: Editora Unijuí, 2020. 112 p.

ECHALAR, J. D., LIMA, D. C. B. P.; OLIVEIRA, J. F. Plano Nacional de Educação (2014–2024) – O uso da inovação como subsídio estratégico para a Educação Superior. **Ensaio: aval. pol. públ. Educ**., Rio de Janeiro, v. 28, n. 109, p. 863-884, out./dez. 2020. Available at: https://www.scielo.br/pdf/ensaio/v28n109/1809-4465-ensaio-S0104-40362020002802143.pdf. Accessed on: 01 Mar. 2021

FEENBERG, A. A fábrica ou a cidade: qual o modelo de educação a distância via web? *In:* NEDER, R. (org.). **A teoria crítica de Andrew Feenberg**: racionalização democrática, poder e tecnologia. Brasília: Observatório do Movimento Social na América Latina/CDS/UnB/Capes, 2010, p. 182-199.

FIORIN, J. L. **Linguagem e Ideologia**. São Paulo: Ática, 2007

HEINSFELD, B. D.; PISCHETOLA, M. O discurso sobre tecnologias nas políticas públicas em educação. **Educ. Pesqui**. São Paulo, v. 45, e205167, 2019. Available at: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1517-97022019000100563&lng=en&nrm=iso. Accessed on: 07 July. 2020.

LIMA, V. A. **Mídia, Teoria e Política**. 2. ed. São Paulo: Editora Fundação Perseu Abramo, 2004.

MALLMANN, E. M.; SCHNEIDER, D. R. Políticas públicas, tecnologias educacionais e Recursos Educacionais Abertos (REA). **Revista Ibero-Americana de Estudos em Educação**, Araraquara, v. 16, n. esp. 2, p. 1113–1130, 2021. DOI: 10.21723/riaae.v16iesp2.15118. Available at: https://periodicos.fclar.unesp.br/iberoamericana/article/view/15118. Accessed on: 18 Nov. 2021.

MARCONDES, D. **Iniciação à História da Filosofia**. Dos Pré-Socráticos a Wittgenstein. Rio de Janeiro: Jorge Zahar Editor, 2004.

MARX, K.; ENGELS, F. **Ideologia alemã:** Feurbach. 2. ed. Tradução: José Carlos Bruni, Marco Aurélio Nogueira. São Paulo: Hucitec, 1986.

MARX, K. **Manuscritos Econômico-Filosófico**s. São Paulo: Martin Claret, 2001.

PARO, V. H. Implicações do caráter político da educação para a administração da escola pública. **Educação e Pesquisa**, São Paulo, v. 28, n. 2, p. 11-23, jul./dez. 2002. Available at: https://www.scielo.br/j/ep/a/TdvrjFR7CfYwx9w3M3Mwqkg/?format=pdf&lang=en. Accessed on: 13 July. 2021.

PEIXOTO, J. Tecnologia e mediação pedagógica: perspectivas investigativas. *In:* KASSAR, M. C. M.; SILVA, F. C. T. (org.). **Educação e pesquisa no Centro-Oeste**: políticas públicas e formação humana. Campo Grande: UFMS, 2012. p. 283-294,

PEIXOTO, J. Relações entre sujeitos sociais e objetos técnicos: uma reflexão necessária para investigar os processos educativos mediados por tecnologias. **Revista Brasileira de Educação**. v. 20, n. 61, p. 317- 332, abr./jun. 2015. Available at: https://www.scielo.br/pdf/rbedu/v20n61/1413-2478-rbedu-20-61-0317.pdf. Accessed on: 01 May 2021.

PEIXOTO, J.; ECHALAR, A. D. L. F. Tensões que marcam a inclusão digital por meio da educação no contexto de políticas neoliberais. **Educativa,** Goiânia, v. 20, n. 3, p. 507-526, set./dez. 2017. Available at: http://seer.pucgoias.edu.br/index.php/educativa/article/view/6836/3809 Accessed on: 01 Jan. 2021.

SAVIANI, D. **Sobre a concepção de politecnia**. Rio de Janeiro: FIOCRUZ, 1989.

SAVIANI, D. O trabalho como princípio educativo frente às novas tecnologias. *In:* FERRETI, C. *et al.* (org.) **Novas Tecnologias, Trabalho e Educação**. Petrópolis: Vozes, 1994. p. 147-164.

SAVIANI, D. Educação Socialista, Pedagogia Histórico-Crítica e os Desafios da Sociedade de Classes. *In:* SAVIANI, D.; LOMBARDI, J. C. (org.). **Marxismo e Educação:** debates contemporâneos. Campinas: Autores Associados, 2005. p. 223-274.

SAVIANI, D. **História das ideias pedagógicas no Brasil**. Campinas: Autores Associados, 2007.

SAVIANI, D. Vicissitudes e perspectivas do direito à educação no Brasil: abordagem histórica e situação atual. **Educação & Sociedade On-line**, Campinas, v. 34, n. 124, p. 743-760, jul./set. 2013. Available at: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-73302013000300006. Accessed on: 01 Jan. 2021.

SOUZA, R. A.; MORAES, R. A. A educação a distância como princípio educativo: Possibilidades e/ou limites. **EmRede - Revista de Educação a Distância**, v. 5, n. 3, p. 460-471, 2018. Available at:

https://www.aunirede.org.br/revista/index.php/emrede/article/view/365. Accessed on: 15 Oct. 2021.

How to reference this article