FOR A DIGITAL PEDAGOGY: A NEW WAY OF TEACHING AND LEARNING

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ABSTRACT

Objectives: This article aims to understand the impacts of digital technologies on elementary, secondary, and higher education in Brazil, highlighting the need for a digital pedagogy suited to the 21st century. It intends to reflect on the crisis and transformation in educational practice caused by the introduction of these technologies. The goal is to promote a debate on the creation of a critical and reflective digital pedagogy that can meet current demands.

Theoretical Framework: The theoretical framework encompasses concepts of pedagogy, digital education, and the influence of Information and Communication Technologies (ICTs) in education. References to authors such as Freire, Habermas, and Aparici discuss the integration and challenges of ICTs in teaching. The reflection considers the cultural and cognitive transformation brought about by the digital environment, analyzing both its benefits and its counterproductive aspects.

Methodology: The research uses an inductive-analytical and bibliographic-documentary approach. It analyzes theoretical sources and studies on the incorporation of ICTs in education, highlighting the evolution of pedagogical practices. The study also considers practical examples of digital technologies in the classroom and their impacts on the relationship between students and teachers.

Originality/Value: The value of the work lies in the critical analysis of the impact of Information and Communication Technologies (ICTs) on education, emphasizing their capacity to transform traditional pedagogy into digital pedagogy. The originality of the study is in its comprehensive approach to how ICTs can reconfigure cognitive economy and address contemporary educational challenges, proposing a deeper and more reflective integration of these technologies into the teaching-learning process.

Results/Conclusions: The introduction of ICTs in education generates an economy of physical and cognitive effort, transforming pedagogical practice. The study concludes that although technology brings innovations and efficiency, it also presents significant challenges, such as the potential dispensability of fundamental skills like writing and critical thinking. It is essential to develop a digital pedagogy that balances the use of technologies with the preservation of the cognitive and cultural foundations of education.

Keywords: Information and Communication Technologies (ICTs), Digital Pedagogy, Learning Transformation, Cognitive Economy, Educational Challenges.

RESUMO

Objetivos: O artigo visa compreender os impactos das tecnologias digitais no ensino fundamental, médio e superior no Brasil, destacando a necessidade de uma pedagogia digital adaptada ao século XXI. Pretende-se refletir sobre a crise e a transformação na prática educacional causada pela introdução dessas tecnologias. O objetivo é promover um debate sobre a criação de uma pedagogia digital crítica e reflexiva que possa atender às demandas atuais.

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Referencial teórico: O referencial teórico abrange conceitos de pedagogia, educação digital e a influência das Tecnologias de Informação e Comunicação (TICs) na educação. Referências a autores como Freire, Habermas, e Aparici discutem a integração e os desafios das TICs no ensino. A reflexão considera a transformação cultural e cognitiva proporcionada pelo ambiente digital, analisando tanto seus benefícios quanto suas contraproducentes.

Metodologia: A pesquisa utiliza uma abordagem inductivo-analítica e bibliográfica documental. Analisa fontes teóricas e estudos sobre a incorporação das TICs na educação, destacando a evolução das práticas pedagógicas. O estudo também considera exemplos práticos de tecnologias digitais na sala de aula e seus impactos na relação entre alunos e professores.

Originalidade/Valor: O valor do trabalho reside na análise crítica do impacto das Tecnologias de Informação e Comunicação (TICs) na educação, enfatizando sua capacidade de transformar a pedagogia tradicional em uma pedagogia digital. A originalidade do estudo está na sua abordagem abrangente sobre como as TICs podem reconfigurar a economia cognitiva e enfrentar os desafios educacionais contemporâneos, propondo uma integração mais profunda e reflexiva dessas tecnologias no processo de ensino-aprendizagem.

Resultados/Conclusões: A introdução das TICs na educação gera uma economia de esforço físico e cognitivo, transformando a prática pedagógica. O estudo conclui que, embora a tecnologia traga inovações e eficiência, também apresenta desafios significativos, como a possível dispensabilidade de habilidades fundamentais como a escrita e o pensamento crítico. É essencial desenvolver uma pedagogia digital que equilibre o uso de tecnologias com a preservação das bases cognitivas e culturais da educação.

Palavras-chave: Tecnologias de Información e Comunicação (TICs), Pedagogía Digital, Transformación de la Aprendizagem, Economía Cognitiva, Desafíos Educativos.
1 INTRODUCTION

The entry of the digital element into the educational field is one of the factors capable of imposing changes never before seen in the form and development of primary, secondary and higher education in Brazil. This new element, factor and technique are generating a crisis, and at the same time, they are imposing a reflexive effort on public and private actors in the form, condition and praxis of the act of teaching, both in person and remotely.

The way of thinking, reading and writing about the reality that surrounds us is oscillating, sometimes productive and sometimes counterproductive compared to the act of teaching. This variance makes the act of writing with the use of a pencil unsafe and unnecessary, when the act of typing, speaking, listening and watching begin, together or separately, to predominate, based on the use of technological tools, at the time of implementation, of the communication act.

Because educating is communicating!

The article is structured based on an inductive-analytical, bibliographical and documentary reflection, aiming to understand the impacts of digital on the educational world in Brazil at the beginning of the 21st century.

The author does not intend to conclude a path to be followed with this text, however, he intends to shed light on an event that is remaining on the sidelines, or rather, we are neglecting the need to build a digital pedagogy capable of clarifying how far reach the forces of our current reason.

Finally, and in short, there is an urgent need for the construction of a Digital Pedagogy capable of explaining the entry, tending to be protagonists, of ICTs/TIDs in the educational space.
My son Peter one day asked me: Father! If the knowledge comes from books, does the cow's milk come from the box?

Not my son! Knowledge and milk are only stored there. Knowledge is produced by a summation of human and non-human factors that can be stored in written form, and milk is produced by a bovine and can be stored in liquid form in a small box, so are moving or seemingly living beings that produce life and the conditions for maintaining this life.

However, since the 21st century, with the expansion of Digital Information and Communication Technologies, such as Artificial Intelligence, Machine Intelligence, ChatGPD among others, the conditions have been created that knowledge and milk can be "built", and not only processed, by non-human beings.

In this last line, the idea is not to oppose humans to non-humans, but to analyze that the technical elements or factors start, in some situations in the world of life, to take a leading role in the actions and thinking of the actors in society. This is because for centuries time has been measured from the clock and the calendar when natural elements, such as the sun, moon, tides, seasons, among others, become secondary elements in the telling (reference and registration) of the history of humanity.

Solar and lunar motion were the basis for the structuring of the hours, days, weeks, months and years for the ancient and modern West, but such real references gave way to an artificial and structuring summation of hours, minutes, seconds among other technical references that by hour order life.

The technique and the machine went on to build, or rather to determine to a large extent, reality, however, a clock that marks the wrong time does not make the day become night, nor for that reason does the presence of the moon on a sunny afternoon make the night happen.

ICTs are producing/building new conditions for building and producing the real world. New theses or scenarios, songs, paintings, cars, screws or milk, everything else that fits or is fitted their techniques can be produced or printed from a 4D printer, finally, the cow would be dispensable in milk production.

We already know that educating is communicating, and because current communication is inflated by technological tools, such tools are present from the first day of life of any child born from the beginning of the 21st century. The presence, use, ease of access, coupled with the high degree of efficiency of the various tasks and/or activities of our daily life, are naturalizing the use of ICTs in the educational space. Thus, children entering the first...
educational years would already be able to use these tools at school, from the access created at home and finally at work.

What is Pedagogy?

It's a science under continuous construction,
It's something that should be communicative.
It's something that should be collaborative, cooperative and constructive.
It's science that creates the right teaching models.
It's science that integrates languages and educational tools.
It's something that should be open to digital and new forms of interaction.
It is the tool that unveils the sense of education,
It's an emancipation tool,
It's the tool that enables the other to co-create.
It's science that thinks about the possibility of creating in the other a better one.

It is prudent to accept that just as philosophy, sociology, theology, pedagogy, together with other sciences, seek to explain and at the same time build themselves, in this incomplete attempt to become real, intersubjective, institutionalizing and structuring a portion of us and the environment that surrounds us.

In the meantime, pedagogy is focused on the act of communicating, teaching, apprehending and more, has the responsibility or the burden of explaining the impact of digital, when such act, technique, tool or methodology becomes part of the act of teaching is linked to the pedagogue (education scientist). This requires the construction of the concept of digital pedagogy, as a sub-theme of pedagogy, which will now seek to expose the productiveness and counterproductive generated by ICTs when performing the act of teaching, educating.

Education for UNESCO (2021) is [...] a empowering right, it is considered as one that "serves in itself for the full development of personality, but it is also necessary to promote and to comply with other human rights and fundamental freedoms such as gender, equal opportunities and environmental sustainability (UNESCO, 2021).

In this way, Pedagogy is an end, and education is a means, and digital is the means of the medium!

Digital pedagogy is composed of material, human and technological resources dedicated to learning, one of its characteristics is to promote new ways of teaching and working, where the use of Information and Communication Technologies (ICTs) represents an opportunity to innovate education at all levels. The use of digital pedagogy implies taking on challenges
because teachers must have knowledge, skills and competences for its use, since it is these who are responsible for steering the learning process. Models of Digital Pedagogy; Giraffa; Casartelli, 2019.

It is (digital pedagogy) characterized by an innovation in education, which stands out by the use of digital environments and use of ICTs. Digital pedagogy entailed, among other challenges, combining didactic knowledge with practice in a virtual environment, where the theoretical aspects of didactics are related to previously professed knowledge, but the challenge is to teach in virtuality. (Monica Selene Meléndez Rivera et al.; 2022).

For some thinkers, digital enculturation is merely the materialization of the innate cultural assimilation to the very nature of school, in that "education cannot be thought out in dissonance of the cultural context in which it is inserted and for whose dynamics prepares the subjects in constant interaction with the socio-cultural environment" (Nonato, 2020).

The school, which still "remains stubbornly rooted in its analog methods and languages" (Sibilia, 2012), is required to meet the demands of the knowledge society, to articulate with its way of producing knowledge, assuming in school life the digital culture that has already become socially naturalized.

Advocates of digital education highlight that changes in communication models and assessment models have changed the structure of institutions. Technology is not just a tool, but an artifact that can enable new forms of learning and knowledge production. The potential for students to participate as collaborators in the construction of knowledge is expanded. Education must be linked to autonomy, freedom to participate in the production of knowledge and the creation of alternative discourses (Aparici, 2009).

While in the pedagogy of transmission students repeat what the teacher "taught" them, in digital pedagogy the student is invited to be author with the same prestige and authority as the mediator. The student produces information and knowledge, and hierarchically is at the same time and level as the rest of the elements in the teaching process. In this learning model there is no "owner" of knowledge and there is no controller of the students' monitoring system. Virtual platforms are invisible control and surveillance systems and constitute a modern panorama. (Aparici, 2009).

However, there are opponents of digital education in education, warning that virtual education, which comes from the business world, has as its purpose profit, or rather, the reduction of production and transaction costs when marketing education. The ethos of digital pedagogy is profitability!

It is easy to accept that in the past 50 years the Lutheran, Pontifical, Methodist, Jesuit, Baptist, Presbyterian, Capuchin, Catholic, Adventist colleges have gone bankrupt (or judicial
recovery), giving way to a business education, have given way to large educational groups with shares in the stock exchange, and EaD and virtual education has gained the traditional educational spaces.

The digital was the oil in the engine of the educational company.

But what happened to the professor in the midst of the digital culture? He was weakened from his role as author, announcer, and inspirer of relationships between individuals and knowledge. Thus, in a certain sense, the transforming power of authority is deactivated and objectified in the experience of the spectacularization of audiovisual stimuli and relations between people (sibilia, 2012).

Teachers hang from content to horism!

In the classroom, the teacher exercised an authority, the fruit of intellectual, moral and technical qualities. It is an attribute of the professional condition of the teacher and is exercised as a stimulus and aid for the independent development of the students. The teacher represents society, acting as a mediator between the individual and society. The student brings with him his individuality and freedom. However, individual freedom is conditioned by group demands and by the demands of the pedagogical situation, implying responsibility. In this sense, freedom is the foundation of authority and responsibility is the synthesis of authority and freedom (Libanon, 1994).

Finally, will the destruction of traditional authorities make us go further and further?

3 THE CRISIS, DILEMMA OR POSSIBILITY OF A NEW SCHOOL(H)A!

The pedagogical trends (traditional, modern and technicalist) (Zuin, 2011), are guided by the influence of assumptions of certain philosophical systems, however, the digital in education has its basis in the economic world, the market, the digital economy.

If in traditional pedagogy the initiative was the teacher, who was, at the same time, the subject of the process, the decisive and decision-making element; and if in new pedagogy the initiative shifts to the student, being at the foundation of educational action in the relationship teacher student, therefore, interpersonal, intersubjective relationship; in technicalist pedagogy the main element becomes the rational organization of the means, occupying the teacher and the student secondary position, relegated to the condition of executors of a process whose conception, planning, coordination and control are in charge of supposedly qualified specialists, neutral, objective and impartial (Saviani 2007).

For Paulo Freire (2005):
[...] teachers need to indicate opportunities to build students' knowledge, through the contradictory interrelationship between authority and freedom, because it is in this dialectical tension that engages, recognizes and feedback the formative becoming, without arbitrariness, justified in sensitivity and "respect for the knowledge of the educator.

There is a new paradigm in education being created by ICTs!

In the contemporary context, digital technologies have a leading role that impacts and conditions, and even defines, the contours of a new conception of society. The scenario is marked by the breaking of the face-to-face paradigm, the one in which we were formally prepared to carry out day-to-day and professional activities, by the overlap/complementarity of virtual space (cyberspace). In this new scenario, we have to re-learn, re-evaluate our conceptions related to training and education. Modelski; Giraffa; Casartelli, 2019.

Is the digital promise to change the monological or dialogical teaching protagonism to a new degree of interaction (digital), so that more and more efficient interaction generated by technology would create a new hope of evolution or of social restructuring? Modelski; Giraffa; Casartelli, 2019.

The individual builds himself on the object of his activity and the artifacts that mediate it. Thus, we can understand technological changes as transformations of the artifacts that mediate the activity they promote and, at the same time, are influenced by the transformations in individuals and by the objects of this activity. (Lalueza; Crespo; Camps, 2010). So our humanity rises to the point of learning to use and incorporate new tools and objects into our daily lives! So technology becomes a cultural tool! So how much more TIDs (Tablets, smartphones, etc.) in the experience, teacher more educational opportunities and possibilities?

Some authors define that Digital pedagogy is not restricted to virtual classes (online, EaD), when access to information and knowledge will be restricted, with more emphasis, images, videos, graphics etc., there is a physical effort (smaller) and cognitive, the same as climbing the floors of a building using the elevator.

The same, classify the Traditional/Classical pedagogy for classroom classes, when the dissemination and access to information and knowledge will be restricted, with more emphasis, reading and writing, generating a physical effort (greater) and cognitive, the same as climbing the floors of a building using the stairs.

For Habermas (1994), "the liberating force of reflection cannot be replaced by the diffusion of technically usable knowledge". In the same vein I quote Freire (2005) "at the service of whom machines and advanced technology are? I want to know for whom, or against whom, the machines are being put in use."
Who are we? We are a sum of human and non-human factors.

This subject transformed in the digital age into a multiplied, disseminated and decentralized subject, continually challenged as an unstable identity. We must begin to suspect with some urgency that we are inhabiting a new planet. The cognitive, communicational and cultural consequences of the digital revolution for the ways of producing and disseminating knowledge, information and art cannot be minimized, because they bring to the heart of our private, professional and public lives burning issues that need to be addressed, far from prejudices, nostalgia and nostalgia. Santaella, 2005.

Humanity guided precisely by specific competences of pedagogical work nourishes voluntary, solitary, passive servitude, lacking the capacity to problematize manipulative obviousness, promoting the elimination of multiple languages and the nullity of shared cultural experiences. This is because, strictly speaking, "those who fail in the performance neoliberal society, instead of questioning society or the system, regard themselves as responsible and are ashamed for this". (Han, 2018)

4 FOR A CRITICAL AND REFLECTIVE DIGITAL PEDAGODY

After the elevators were created and installed in our buildings, who went on using the stairs, or rather, when we used the stairs? Ladders are used when there is no light, or when the elevator is in maintenance, of this reality, writing by hand with the use of a pencil or a pen is like using the stairs in a building of dozens of floors, it is suffered, tiresome, generates pain in the hand, in the wrist, so we will prefer to type, or rather, just talk and see the ICTs build the text, already corrected, adjusted, improved.

In the images that are now cited below, we will see that part of the human actions that required physical effort were replaced, supplemented or added. For some, the situation has been improved, since the manual effort/work/activity (human energy expenditure) used to draw milk from a cow has been replaced by the technical/mechanical effort (electrical/hydraulic/electronic energy, etc.) of the milkers. With this saving in human energy (or saving in the use of human input) that used to be spent in the manual activity of taking milk can be directed towards other activities related to the market, the family, leisure, among others.
The use of milkers is related to the level (quantity and quality) of the milk produced, processed, marketed, time spent, labor available, sanitary requirements, along with other various conditions.

So when you ask a person over 40 if they know how to draw milk, they're certainly going to move their hands as if they're squeezing it, but in reality that activity of hand milk is restricted to the tiny, subsistence family properties, when the huge amount of milk that they're currently drinking is being milked by machines, and then the milk is going to be made by machines, as are drugs from the pharmaceutical industry.

What prevents milk from being printed by a 3D food printer? In this case, the printer will not only process the milk, but produce it, which would make daily use of millions of cows around the world unnecessary.

Similarly, the physical effort (human energy) of the feet and legs used in the activity of ‘climbing and descending stairs’ has been replaced by the technical/mechanical effort (electrical/hydraulic/electronic energy, etc.) of the lifts.
In the same vein, the physical effort (human energy) of the hands and arms employed in the activity of "washing the clothes" was replaced by the technical/mechanical effort (electrical/hydraulic/electronic energy, etc.) of the washing machines.

**Figure 3**
*Washing clothes*

![Washing clothes](image1.jpg)

Along the same lines, the physical effort (human energy) of the hands and arms used in the activity of "washing the dishes" was replaced by the technical/mechanical effort (electrical/hydraulic/electronic energy, etc.) of the washing machines.

**Figure 4**
*Washing the dishes*

![Washing the dishes](image2.jpg)

It is important to note that the traditional classes in which the teacher and students are present in the classroom, where the interaction is direct, then mediated by speech, looks, gestures and the rest, are being replaced or added, or even, mediated, by technological tools, which creates the conditions for saving human input when carrying out the act of teaching.
Figure 5

*Technology tools in education*

If that were not enough, the physical effort (human energy) of the hands and arms employed in the activity of "writing and or typing" is being replaced by the technical/electronic/digital effort (electrical energy/machine energy/computers and AIs, etc.) of the devices that produce the text for us from some norths or criteria created by us and assimilated by artificial intelligence. Then the text comes out ready to be published, just as the dishes and clothes come out clean to be used, and the economy of human input becomes central, as does its dispensability in some day-to-day activities/tasks.

I quote, below, common images involved in education and work:

Figure 6

*Common images involved in education and work*

Imagine the following father-son dialog:
Dad! Dad! I don't want to write with pencil or pen anymore, I just want to type! Or rather, I don't want to type anymore, I don't want to read, I just want to listen and watch! It is notorious that the act of writing by hand, is losing centrality in our day to day, and with it, the act of reading what was written tends to decline, both are losing space for the act of seeing images, hearing sounds (audio book) and the very act of thinking, cogitating while human attitudes apt to the production of the text or of the article, or book, or order of a judge, are being protagonized by systems, supported in techniques and knowledge, that sometimes operate from digital.

I name this event, which has now been hailed at the beginning of this 21st century, as digital counterproductive, and this may be the central focus of digital pedagogy in the coming decades. It lists the decline in the use of handwriting, eye injuries, cognitive lesions, the dispensability of the teacher in the act of teaching, the dispensability of face-to-face interaction when the act of educating, the dispensability of real and face-to-face apparatuses, among others.

The dispensability of the act of writing is on the verge of becoming real! So, like the use of stairs in a building with elevator! Both lead to saving human energy, which can be directed to other human demands or activities as well.

The use of digital keys, the use of image and sound, the typing, or rather, the system that listens to my speech and types the text dismissing the act of writing are real facts that are occurring with children and adults, lay or professional, at home or at work, with rich or poor.

The loss of human importance and centrality in the face of the act of teaching, or the elevation of human autonomy in the face of the act of learning, represents the central point that digital pedagogy must stick to.

I remember my grandmother washing clothes on a board full of small horizontal pyramids through which the clothes passed, however, with the washing machine such work or physical effort had been absorbed by the machine.

Cognitive Economics is the best concept or category I can think of at this moment, capable of summarizing the role and impact of ICTs in our daily lives.

Along the same lines as the physical/labor energy savings generated by the implementation of factors, objects, techniques and machines in our daily lives, we currently have the so-called cognitive economy, which can be translated as follows: if a washing machine saves the physical effort of hands and arms, digital through artificial intelligence is generating or creating the conditions that the machine constructs the text, the work, the music, in short, the machine can now produce the text, then it creates a form of cognition, able to save our thinking, our reflecting our remembering, our foreseeing, our planning.
ChatGPD produces the text, under a certain number of criteria or norts, required by us, so we do not need to write by hand, or even type the said text or piece, or contract, when the physical and cognitive energy savings are united by a simple program. I remember professionals reporting surprised that you need digital some points and then the system gives you a ready text, which, most of the time, is better than what I would produce. In the same vein, the washing machine washes much better than the wooden board, and is much better than the stones on the riverside.

TICS, TIDs, and AI not only save human physical effort when performing the task or activity, but save human cognition, and such a contemporary fact, act, or event needs to be reflected by digital pedagogy, for the extent to which thinking can be invoked by digital without this damaging the founding foundations of humanity.

5 CONCLUSION

ICTs or TIDs generate physical economy of human input in the various activities and tasks of human life, as well as a tractor when to the earth in the place of hundreds of workers with their swollen ones, however, the cognitive economy generated in the various activities and tasks of human life, then produced and built by digital can generate facts, acts or events not foreseen or loved by humanity, can generate the dispensability of the act of writing, such as the dispensability of the act of thinking, foreseeing, planning, painting or musicizing life in society.

This risk, phase, crisis or criticism must be linked to pedagogy, and this is the science capable of understanding the presence and impacts of digital in education.

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