# The application of Digital Information and Communication Technologies (DICTs) in Geography teaching: beyond instrumental visions[1]

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**ABSTRACT**

The Digital Information and Communication Technologies (DICTs) - smartphones, computers and tablets, among other devices - have been changing the different social relationships, in general, and the process of knowledge construction, in particular. When talking about DICTs in the school environment, we often find positions that conceive these technologies only as "teaching materials" or "methodologies", which means considering them as simple didactic and pedagogical tools. In this sense, aiming to overcome instrumental views about DICTs, in this article we propose the compression of digital technologies as devices responsible for generating new ways of teaching and learning, emphasizing the contents worked in school Geography and the pedagogical possibilities of application of digital technologies in this discipline. Our research procedure was characterized by a literature survey on the social and cognitive impacts of digital technologies. We found that DICTs, more than potential paradidactic resources, are cultural artifacts that can modify the way the brain learns.

**KEYWORDS:** DICTs, Methodologies, Basic education, Cognition

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*As Tecnologias Digitais da Informação e Comunicação no ensino de Geografia: para além de visões instrumentais*

**RESUMO**

As "Tecnologias Digitais da Informação e Comunicação (TDICs) – *smartphones* computadores e *tablets*, entre outros aparatos – têm modificado as diferentes relações sociais, de maneira geral, e o processo de construção do conhecimento, de modo particular. Quando se fala em TDICs no ambiente escolar, não raro encontramos posicionamentos que concebem estas tecnologias somente como "materiais didáticos" ou "metodologias", o que significa considerá-las simples ferramentas didático-pedagógicas. Nesse sentido, visando superar visões instrumentais sobre as TDICs, no presente artigo propomos a compressão das tecnologias digitais como dispositivos responsáveis por gerar novas formas de ensinar e apreender, enfatizando os conteúdos trabalhados na Geografia escolar e as possibilidades pedagógicas de aplicação das tecnologias digitais nessa disciplina. Nosso procedimento de pesquisa foi caracterizado pelo levantamento de literatura a respeito dos impactos sociais e cognitivos das tecnologias digitais. Constatou-se que as TDICs, mais do que potenciais recursos paradidáticos, são artefatos culturais que podem modificar a maneira como o cérebro aprende.

**PALAVRAS-CHAVE:** TDICs. Metodologias. Educação básica. Cognição.

*Las Tecnologías digitales de la Información y la Comunicación (TIC) en la enseñanza de la Geografía en la Educación Básica, además de visiones instrumentales*

**RESUMEN**

Las "Tecnologías digitales de la Información y la Comunicación" (TDIC) – computadoras, teléfonos inteligentes y tabletas, entre otros dispositivos– han modificado las diferentes relaciones sociales, en general, y el proceso de construcción del conocimiento, en particular. Al hablar de las TDIC en el ámbito escolar, no es raro encontrar posiciones que conciban estas tecnologías solo como "materiales didácticos" o "metodologías", lo que significa considerarlas como simples herramientas didáctico-pedagógicas. En este sentido, con el objetivo de superar visiones instrumentales sobre las TDIC, en este artículo proponemos la compresión de las tecnologías

digitales como dispositivos responsables de generar nuevas formas de enseñanza y aprendizaje, enfatizando los contenidos trabajados en la geografía escolar y las posibilidades pedagógicas de la aplicación de tecnologías digitales en esta disciplina. Nuestro procedimiento de investigación se caracterizó por un relevamiento de la literatura sobre los impactos sociales y cognitivos del uso de tecnologías digitales. Se encontró que las TIC, más que potenciales recursos paradidácticos, son artefactos culturales que pueden cambiar la forma en que el cerebro aprende.

**PALABRAS CLAVE:** TDIC. Metodologías. Educación básica. Cognición.

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## Introduction

In recent years, in the educational field, much has been said about the so-called "didactic innovation". In practice, this means adopting certain pedagogical materials and methodologies that dialogue with the everyday life outside school; seeking, in this way, to make the classroom a more attractive, interesting, and pleasurable space for the student. As a well-known pedagogical jargon, widespread in different spheres of society, but of unknown authorship, points out, "we have 19th century schools with 20th century teachers for 21st century students".

To corroborate this reality, Silva and Gomes (2019, s/p) emphasize that "learning disabilities are in evidence nowadays, as shown by the high numbers of reports arriving at schools and the increase in the dropout rate due to them". Regarding the contemporary individual's ways of being in the world, Penha and Melo (2016, p. 130) point out that the school "has difficulties in keeping up with the evolutionary pace of technology and adapting to the multiple identities and identifications of the students, especially the young".

To this debate, Demo (2011) adds that, despite the constant contact of young Brazilians with virtual space, a significant gap still persists between the potential of new technologies and school practice. Most students have

contact with computers, cell phones and tablets; while, on the other hand, many teachers remain disconnected and, not infrequently, are resistant to incorporate new technologies into their teaching practice.

According to Masetto (2009), school education, in general, does not value the use of technologies as a possibility to foster new pedagogical practices that can produce significant advances in the teaching-learning process. For this author, what has been sought is the mere improvement of old techniques and not the creation of a new paradigm.

Consequently, the incorporation of technology in the school environment has been marked by numerous contradictions. On one hand, there are many teachers, trained in a pedagogy based on the accumulation of information; on the other hand, there are the students, in constant contact with digital technologies, inside and outside the school environment.

Not by chance, most of the discourses on didactic innovation are related precisely to the introduction of the so-called Digital Information and Communication Technologies (DICTs) into the school space, represented by personal computers, laptops, smartphones and tablets, among other digital devices.

However, as usually happens with speeches disseminated on a large scale, used in various contexts, with different meanings, the idea of didactic innovation, on many occasions, far from enhancing the teaching-learning process, can be trivialized, become a mere pedagogical fad or be used as a pretext for selling free courses of dubious quality, mere slot machines that are available in the virtual educational market.

On the other hand, it is important to emphasize that, to criticize the merely instrumental view of DICTs, does not mean neglecting the pedagogical potential present in modern digital devices, because the teacher who vehemently denies technology, cannot also deny the fact that it is constantly present in the students' daily lives. "In contemporary society, children are already born immersed in a media world and live different

relationships with digital technology" (GOMES, 2016, p. 152). Therefore, remembering Ladeira and Leão (2018, p. 103), it is plausible to consider that "the new generations, grown completely immersed in information and communication technology, can hardly imagine what learning would be like outside the digital world".

Moreover, the fact that many teachers do not incorporate technological artifacts as pedagogical resources (and, on occasion, even prohibit their use in the classroom), may be one of the reasons that lead students to perceive computers, smartphones and tablets only as sources of entertainment and not as learning materials.

This controversial issue became evident during the 2020 and 2021 school years, with the so-called "remote teaching" adopted during the Covid-19 pandemic, when face-to-face classes were interrupted and migrated to the virtual environment, in order to reduce the spread of the new coronavirus Sars-CoV-2 (the pathogen that causes this disease) among the population.

Thus, the physical presence of professors and students in the spaces of face-to-face classrooms were "replaced" by "digital presences", in online classes, in what is called "social presence", in which two conceptions of time were provided. The synchronous time, corresponding to the virtual presence in real time, with the use of social networks and digital platforms; and the asynchronous time, with recorded activities and classes, later made available to the student through platforms (BEHAR, 2020).

At the time, a considerable portion of students had difficulty understanding that their digital devices, the only way to access both teachers and didactic content in remote education, could also be used as devices for the learning process (GALIANO; SANTOS, 2021, IBGE, 2021). Therefore, the pandemic brought an excellent opportunity "to rethink the school, the teaching-learning relationship and the importance of empowering teachers and students to access information more constructively and more efficiently" (GALIANO; SANTOS, 2021).

In view of the considerations made in the previous paragraphs, we consider it possible to overcome the merely instrumental character of the DICTs. To do so, it is essential to conceive them not only as "teaching materials" or "methodologies", but as constitutive elements of the human cognitive process, that is, as devices whose continuous use can change the very way the brain learns a given content. Thus, this paper discusses the incorporation of DICTs associated with the teaching of Geography beyond the merely instrumental view and simplistic discourses of "didactic innovation".

According to Tonetto and Tonini (2021), digital mobile devices (smartphones, tablets, notebooks, etc. ), besides contributing to generate new ways of being in the world, produce other spatiality to the contemporary subject, less binary, strongly implied in blurred boundaries between physical and digital spaces; becoming increasingly difficult to define, a priori, where one begins and ends the other, as proposed by the metaphor of interstitial space of Santaella (2007), or from Massey (2012), who considers that space and cyberspace are mutually implied and should not be dichotomized.

Thus, aiming to overcome the lines of thought that conceive ICTs as mere didactic and pedagogical tools, we propose the compression of modern technologies as devices that make teaching and learning subjective in contemporaneity.

It is important to emphasize that we do not intend to present, throughout our text, a prescription, instruction manual or a kind of compendium on how to incorporate ICTs in the teaching of Geography in basic education. Nor do we intend to establish patterns to be followed hermetically, to build Salvationist models for the classroom, or to indicate how teachers should act in certain situations. We do not conceive of our statements as uncritical, complete or absolute.

Regarding methodological aspects, this text is based on a "literature search". Our study procedure was characterized by a literature survey on

the knowledge currently produced about the social, cognitive and affective impacts of the use of digital technologies.

As our intention is to present some cognitive transformations posed to the contemporary individual by digital technologies, we consider it fundamental to promote an interdisciplinary perspective. For this reason, we resort to a broad theoretical reference, from different scientific fields such as Communication Theory, Geography, Linguistics, Computer Science, Sociology, Neuroscience and Pedagogy.

## DICTs and the constitution of the contemporary subject

For contemporary children and young people - who spend an average of nine hours a day with smartphones (therefore, almost twice as much time as they would spend in school) - it is probably quite complex and controversial to imagine what reality would be like without the Internet (EM MOVIMENTO, 2018). According to the TIC Kids Online Brazil 2019 survey, 89% of Brazilians between 9 and 17 frequently access the world wide web, and of this audience, only 5.5% have never accessed the world wide web (TOKARNIA, 2020).

Even virtually integrated adults can present similar speculative difficulty, since several of their activities, such as looking for a new job, receiving public benefits, handling bank accounts and meeting up with old friends, can also be done online.

Among the factors that make the Internet a very attractive communication vehicle, Ladeira (2020) mentions social networks such as WhatsApp, Facebook, Twitter and Instagram, services such as sending and receiving e-mails, browsing hypertexts, file exchanges, access to online videos, enrollment in higher education and post-graduation courses in the distance learning modality, and the possibility of meeting new people through chats and applications.

Given this context, Schmidt (2015), quoted by Kurtz (2015) stated, "The internet will disappear [...]. There will be so many IP addresses and so many devices, sensors and things to wear, that we will be interacting with them without even feeling them, they will be part of our presence all the time." Contrary to what one might assume, this statement is not related to the end of the Internet. It is an assumption based on the fact that the World Wide Web is so intrinsic in our daily lives, that is, it is part of our everyday life with such intensity, that it is plausible to infer that, in the short/medium term; the use of the Internet will be so naturalized that we will not notice it anymore.

It would not be hyperbolic to infer that the internet has changed human existence, establishing new patterns of communication, relationship, and information. In this sense, Castells (2015) points out that the concept of "information society" - by identifying technology and information as constitutive agents of both the production process and social relations - stands out as a paradigm of contemporary society. "Thus, the informational society would be a specific form of social organization, in which the generation, processing and transformation of information become a fundamental source of sociability" (SENADOR, 2018, p. 100).

In turn, Santaella (2004), considers that the emergence of digital culture and its electronically mediated communication systems have transformed the way we think about the subject, also changing the shape of society. For Ladeira (2017), increasingly many people's "real lives" are dependent on and inseparable from their "virtual profiles," available on sites such as Facebook and Instagram. Consequently, "'virtual life' and 'real life' tend to get so mixed up that it would not be an exaggeration to say that if a given event has not been properly recorded and shared on social media, we begin to doubt whether it really 'happened' in 'reality'" (LADEIRA, 2017, p. 19). Thus, any holistic analysis of human relations cannot fail to mention digital social networks.

The hyper-connected individual, whose constitution of the "I" is crossed by its relationship with the virtual space, especially with social networks, represents the predominant profile of today's students. It is important that the teacher, before working pedagogically with ICTs in the classroom, has this issue in mind, which requires understanding the great value that children and young people place on their digital devices.

Recalling the title of a work by McLuhan (2005), smartphones can already be considered as a kind of extension of the bodies and minds of those who make up the so-called "Generation Z" (people born between the mid-1990s and 2009). For them, reality is inconceivable without ICTs. Accessing the World Wide Web is as natural as breathing, eating or sleeping. From the moment they wake up to the moment they fall asleep, screens are an omnipresent element in their routines. Technological devices are able to integrate themselves into the various dimensions of their lives; whether for leisure, study, reading news, or interacting with other people.

In this context it is possible to say that Google, to some extent, is a constitutive "part" of their brains. Their "eyes" are the smartphone cameras. Their personalities (or what they believe themselves to be) are in the profiles they manage on social networks (where they have more "friends" than in the "real world"); with this logic, being "popular" means having thousands or millions of followers on Instagram. Besides the processes of sociability and socialization, ICTs also influence the acquisition of information and the construction of knowledge by the contemporary student. This theme will be addressed in the next topic.

## DICTs and knowledge production

The process of knowledge construction is one of the most complex acts of the human being. Although learning also occurs in other animal species that inhabit the planet (from insects to primates), man is the one who has more

complex learning capabilities, developed and with greater flexibility (POZO, 2020; NUNES; SILVEIRA, 2015). For Friedrich and Preiss, (2006, p.57) "every human being wants to learn all his life, from the moment he is born", a factor that gives learning the status of an essential quality of *Homo sapiens.*

Vygotsky (1989) considers learning as a crucial process in human development. Over thousands of years, as a species (phylogenetic aspect) and as a being (ontogenetic aspect), man "advanced from a primitive reality to build civilizations, discover important scientific knowledge, experience new forms of social interactions, making himself and the world around him more complex" (NUNES; SILVEIRA, 2015, p. 10).

However, the act of knowing, besides the human factor, is related to technical modifications. If human capacity can create or modify technology, the reverse effect also occurs. Technological resources influence the way in which people acquire knowledge, transforming the ways of learning, knowing and thinking, which provides new dynamics and interactions between subjects, objects and the environment (LEVY, 2002). In other words, cognition is the result of complex networks in which human, biological, and technical actors, interact together (LÉVY, 2010). The different technologies enrich our possibilities of learning and facilitate new discoveries, because they enhance the ways we think, communicate and acquire information, building knowledge.

For Prensky (2001), children born after the 1990s grew up immersed by technologies and digital media. Therefore, they would have their cognitive profile changed, as also pointed out by theorists such as Gabriel (2010) and Wolf (2019).

In this sense, Cavalcanti (2008) emphasizes that the DICTs play an important role in the learning process, since the amount of content available to the student becomes global and practically instantaneous. "Thus, we can consider that the use of DICTs [...] have great didactic potential for teaching" (ABDALLA-SANTOS, 2014, p. 61).

On the other hand, theorists such as Carr (2005) and Wolf (2019) suggest that the indiscriminate use of digital devices by children and young people tends to cause cognitive changes related to reading quality, analytical ability, argumentation, and the atrophy of memory functions, these being taken over by an "electronic memory", present in digital technologies. Following this line of reasoning, Silva and Silva (2017) point out that the excess of unprocessed information with which we are faced daily in the virtual space - that is, the large volume of data received by the brain in the form of text, images, and videos - can cause our memory to become saturated, generating cognitive overload instead of knowledge.

> Access to information is no guarantee that knowledge will result from it, much less learning. For this to occur, it is necessary that, when faced with the information presented, people can re-elaborate their knowledge, aiming at a new construction. This construction should be based on cognitive parameters that involve self-regulation, motivational aspects, reflection and criticality in the face of a flow of permanently updated information (CASTELLS, 2003, p. 129).

For Sartori (2012), the dizzying flow of information on the Internet causes "distracted learning", where the attention on something is mobilized/captured for a shorter and shorter time. Not coincidentally, a study conducted by Ophir, Nass and Wagner (2009) suggests that compulsive users of social networks such as Facebook and Instagram have less ability to retain information and make task changes while maintaining productive efficiency. This is because these individuals, when they are performing a certain activity, are more vulnerable to interruptions caused by checking notifications on their smartphones.

> In the communicational practices in cyberculture, it is very easy to get out of the focus, there are numerous types of notices that interrupt the tasks, besides reminders and calls in chats, the hypertexts take us easily and constantly to other points not foreseen at the beginning of a conversation, a search, a consultation on a specific subject and so on, intensifying the "distracted learning" (TONETTO, 2017, p. 108).

It is a fact that the simple acquisition of data does not automatically lead to learning. For a new piece of information to effectively become knowledge, there is a long hermeneutic path. According to Silva and Silva (2017), in this context of cognitive overload, flood of information and stimuli, "adolescents are not acquiring the necessary understanding, and information is not being processed or associated with others to generate a deeper understanding" (SILVA; SILVA, 2017, p. 93).

In view of the reflections made above, as well as Tonetto and Tonini (2018), we do not conceive the DICTs only as tools or "motivational resources for fixing the content to be worked in the classroom" (TONINI, 2013, p. 52), but as elements that condition cultural transformations, generate new forms of social relations and influence the process of knowledge construction.

By emphasizing the importance of technical objects in the processes of memory, attention, perception, and thought, we move away from "an instrumental conception of technology, in which the instrument is a means to an end" (TONETTO, 2017, p. 56).

Consequently, it opens up the possibility of thinking both a technical dimension of thought and a cognitive dimension of technique, and the technical objects start to be seen not only as auxiliaries in the execution of tasks, but as agents of constitution and transformation of thought, because the way we think is affected/altered/possibilized by the

technical artifacts that we produce and use. Thus, more than a potential resource/tool/methodology, under the didactic aspect, technology is, above all, a language that makes teaching and learning subjective in contemporary times.

## DICTs and geographical knowledge

In relation to School Geography (and to geographic knowledge, in general), the changes associated with ICTs point to considerable modifications in the perception and conceptualization of key categories and themes worked by this discipline. As Ribeiro (2019) shows, issues related to the representation of contemporary space (object of study of geographic science) require a critical and analytical look at digital technologies, because the popularization of mobile devices equipped with geo-location features, as well as the diffusion of online mapping platforms, have driven new ways of thinking, exploring and experiencing space. Thus, the use of these technologies points to significant changes in our experience with places, as these interfaces "shape our bodily engagement with space" (FARMAN, 2012, p. 44). This means that, from the moment an individual accesses the World Wide Web, his/her performance in the world and interactions with other people are no longer necessarily conditioned to his/her physical location.

According to Santaella (2013), the environments created in cyberspace, augmented by mobile technologies, force us to reconsider space, its legibility, and the way people re-encounter it; for when the movement of the city and human mobility - both technologically mediated - intersect, multiple spatialities can intersect.

Also the notions of orientation, location and displacement - indispensable for learning Geography - have become relative from the constant use of DICTs. For Virilio (1993), we are moving towards the "abolition of mobility", in which we increasingly decrease the time we

spend traveling, going from one place to another, because several activities of contemporary life - such as holding work meetings, meeting people, making friends, attending classes, accessing information and discussing ideas - can also be performed in the virtual world.

In a similar line of thought, Santaella (2007) resorts to the term "interstitial space" to demonstrate how mobile devices for continuous connection promote the hybridization of physical and digital spaces, with the boundaries between both increasingly blurred (creating a proper space - fluid and multiple - that belongs neither to the physical nor to the virtual domain), making subjects not only connected, but, above all, connected.

In short, we can conclude that the interactions between human beings and technologies build different ways of looking at, apprehending, interpreting, and feeling the world. Consequently, our corporal engagements, valuations, actions, and perceptions in relation to the structuring concepts of geographic science - space, place, territory, and landscape - tend to change with the use of DICTs.

Therefore, it is plausible to assume that the traditional notions/definitions/concepts of "space", "landscape", "territory" and "place" are no longer sufficient to explain the complexities present in the new spatialities and territorialities built through our interactions with different digital devices.

Nevertheless, contents worked in School Geography are also present in texts, images and videos made available on the internet; however, in many occasions, in an uncritical, superficial, distorted and/or mistaken way. For the so-called "flat-earthers", the shape of our planet would be "flat" and not "geoid", thus contradicting scientific knowledge confirmed centuries ago. Likewise, the geopolitical falsifications in virtual space are notorious, such as the association between Nazism and the extreme left, the premise that the Foro de São Paulo would aim to implant communist regimes in Latin America, or

conspiracy theories such as "globalism", "bionic world religion" and "new world order" (in this case, not referring to the post-Cold War rearrangement of international relations).

It is not rare that students of basic education agree with the controversial contents exposed above, which tends to compromise the learning of themes related to Cartography, Geopolitics and Globalization. In this sense, it is important that the teacher understands that, from the pedagogical point of view, the DICTs can both facilitate the access to a large number of contents related to School Geography, and contribute to the propagation of hypotheses without any scientific basis, a factor that contributes to confuse the student in his process of knowledge construction.

## Pedagogical experiences with the use of DICTs

In this topic, successful pedagogical practices that used digital technologies as teaching materials and objects of reflection will be presented. The examples used are in the works of Bogo, Caxueira and Nascimento (2020), Giordani (2010) and Ladeira (2020).

Bogo, Caxueira and Nascimento (2020) describe a pedagogical practice with Google Earth and Google Maps (which also used The True Size website), carried out in a pre-university course for low-income students, in which the use of these virtual tools, together with a physical globe, allowed students to improve their learning performance in topics related to Cartography (specifically the contents of map projections and geographic coordinates).

The contact with The True Size website allowed students to visualize, in a practical way, the distortions caused by the Mercator Projection in different national territories. Moreover, the combined use of the globe and Google Earth led students to a better understanding of the concepts of location, projection and adaptation, enhancing their skills in map reading,

scale variations and, especially, issues involving aspects of globalization and other fundamental themes for School Geography.

According to the authors, in comparison with traditional methodologies, which resort only to the textbook for Cartography teaching, the diversification of didactic resources and the deepening of geo-technology tools, such as Google Maps and Google Earth, are essential strategies for both teachers and students, making the activities more profitable and of better assimilation.

In turn, Giordani (2010) advocates that the school incorporates the model of collective construction of knowledge present on the Internet, called "ubiquitous learning", whose learning happens anywhere, at any time, from various access devices and interconnection networks. Acting this way, according to the author, the teacher will be promoting student protagonism in the classroom dynamics.

To corroborate his argument, Giordani (2010) organized a pedagogical practice, with a 5th grade class, in which students elaborate digital didactic materials to study issues related to Geography.

Suggested by the students themselves, the themes contemplated were: music, sports, technology, and tourism. Four groups were organized. Each student chose the group he or she would participate in based on his or her affinity for one of the proposed themes.

For the production of the activity, the students went to the school's computer lab, so they could do some research on the Internet about the content covered in their study topic.

However, as the information collected from the World Wide Web was not enough for the elaboration of the digital teaching materials, the need arose to do field work (a fundamental practice for the teaching of geographic content).

With the necessary authorizations from parents and guardians, the students did field work, where they could have contact with people who had information about the issues addressed. Back at school, the students started the process of preparing the screens present in the digital teaching

materials, which, in general, followed the following script: first screen, title of the work; second screen, credits to the authors and collaborators; third screen, texts about the themes; and last screen, questions about the contents worked on.

Finally, the idea of building an online repository for publishing the digital content developed by the students emerged. To this end, a website was created where the four works produced were made available for download.

According to Giordani (2010), the students evaluated the presented proposal positively, because to the extent that they were asked to build their own learning instrument, they became an active part in the teaching process, which allowed their impressions, opinions, ideas and creativity to be put into practice.

Thus, as a result, it was possible to verify that the authorship of digital materials by the students themselves is a pedagogical practice that allows the enhancement of school learning.

Ladeira (2020) proposes that virtual space (which includes both the devices used to access it and the various contents present on the web) be addressed in the classroom as an object of reflection/problematization for students and teachers. As a practical example of his ideas, the author cites a seminar, entitled "Virtual space: risks and possibilities", held with Proeja students during the second school semester of 2019.

The pedagogical experience in question consisted in dividing the class into twelve groups. Each group was responsible for presenting a text whose main theme was the Internet. The texts were divided into two main areas: "Influence of the virtual environment on social relations" and "Impacts of the Internet on the teaching-learning process", as shown below:

> The articles present in area 1 - "Influence of the virtual environment in social relations" - seek to understand how computers, cell phones and tablets, among other

technological devices, can influence society and highlight how social networks modify interpersonal relationships and the notions of past and present. [...] The texts in area 2 - "Impacts of the Internet on the teaching-learning process" - demonstrate how the virtual medium has transformed the production and dissemination of knowledge (LADEIRA, 2020, p. 23).

Still according to Ladeira (2020), before starting the proposed seminar, the teacher reminded the students of the importance of discussing the virtual space at school, a privileged space for the critical formation of citizens. The teacher also hoped that, after the discussions, the students would reflect more on how they use the Internet in their daily lives.

According to the author, the great interest of the students in participating in the seminar demonstrated that promoting this type of activity, addressing the virtual space, a theme so present in students' daily lives, but, in general, still neglected in schools, is an important pedagogical practice, "not only for leading students to reflect on how they use the Internet in their daily lives and in school research, but also stimulates them to formulate arguments and express their opinions in the classroom" (LADEIRA, 2020, p. 36).

**Conclusion**

Technological resources such as Google Maps, Google Earth, Geo-play and Georeferencing by satellite (GPS), among others, show that the knowledge and skills inherent to Geography are increasingly present in the daily life of the contemporary citizen, in digital environments. Given this reality, as teachers/students/researchers, it is up to us to ask if this technological daily life is also present, with the same intensity, and in a critical and meaningful way, in Geography (both at university and at school).

Before the teacher incorporates DICTs to the classroom dynamics, we consider it essential that he/she takes into consideration the potential cognitive and pedagogical impacts of these technologies in the teaching-learning process in basic education - which requires identifying the different ways of teaching and learning that emerge in the digital culture. The mere introduction of technological resources in schools does not necessarily guarantee didactic innovation. Nor does it automatically bring about valid and fruitful changes in the organization of the educational system. The new technologies are, for learning, only a means, because the one who learns, in fact, is the student, not the machine.

In the current educational context, as Litto (2010) warns, the teacher who limits his or her craft to delivering facts and knowledge to students will be "replaced" by computers and websites, which do this task in a more agile and consistent manner, twenty-four hours a day, seven days a week. On the other hand, the professional who concentrates his efforts in creating environments and tasks that allow the student to discover, facts and knowledge under different possibilities of interpretation of the information obtained, will never be replaced in face-to-face or distance learning.

In order to make sense, to capture the students' attention, traditional pedagogical practices are not enough; contemporary young people, inserted in the digital culture, demand classes that correspond to the spaces and times of their daily lives (GIORDANI, 2016). Thus, the pedagogical success of DICTs (or any other paradidactic materials) depends, inexorably, on methodologies that are well designed and conducted by teachers and other professionals involved in the teaching-learning process.

Therefore, as important as the availability of equipment or the provision of connectivity in the school space, is to promote reflection on the digital culture, which leads the student to know how to properly use the DICTs and to think more critically about them. Thus, it is essential that teachers and students critically analyze the large number of

informational content that are available in virtual space, because, in the current context, the concept of intelligence is no longer related to the accumulation of information, but understood as "the ability to establish connections, review them and redo them" (CRUZ, 2007, p. 1038).

In this sense, a class with the aid of modern technologies, but without adequate and well-defined planning and scripts, can become a class without purpose, both for the student and for the teacher. It is not enough to change the media support, without, however, changing anachronistic educational practices. Acting this way, the teacher will only be presenting a facade of modernity, remodeling the "old" into new artifacts. In face of this reality, in many occasions, the (apparent) modernity can hide a traditional teaching, based on the mere reception and memorization of information.

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