

## EDUCATION, TEACHER FORMATION, DICT, AND HEALTH IN TIMES OF COVID-19 PANDEMIC: A LITERATURE REVIEW

### *EDUCAÇÃO, FORMAÇÃO DOCENTE, TDIC E SAÚDE EM TEMPOS DE PANDEMIA PELA COVID-19: UMA REVISÃO DE LITERATURA*

### *EDUCACIÓN, FORMACIÓN DOCENTE, TDIC Y SALUD EM TIEMPOS DE PANDEMIA POR COVID-19: UNA REVISIÓN DE LA LITERATURA*

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**ABSTRACT:** This article aimed to review, through the literature, the challenges and transformations imposed by the COVID-19 pandemic education, the main contributions of teacher education to innovation in the teaching and learning processes with the use of DICT and the possible health consequences of increased time of screen and high sedentary behavior. The results show that, given the challenges of education due to the pandemic, the domain and understanding of knowledge about the DICT used in the school environment are essential for teachers, which implies the need for training courses of teachers who support the integration of these technologies in curriculum and pedagogical practices. It is noteworthy that the long exposure "screen" time can harm health, and thus, it is necessary to provide guidance to teachers and students, in the sense of preventing damage to mental health.

**KEYWORDS:** Education. Pandemic. DICT. Time of screen.

**RESUMO:** Este artigo teve como objetivo revisar por meio da literatura os desafios e as transformações impostas pela pandemia da COVID-19 à educação, as principais contribuições da formação docente para inovação nos processos de ensino e de aprendizagem com a utilização das TDIC e as possíveis consequências à saúde do aumento do tempo de tela e elevado comportamento sedentário. Os resultados mostram que diante dos desafios da educação em virtude da pandemia, o domínio e o entendimento dos conhecimentos sobre as TDIC utilizadas no ambiente escolar, são essenciais para os docentes, o que implica na necessidade de cursos de formação de professores que subsidiem a integração dessas tecnologias nos currículos e práticas pedagógicas. Destaca-se ainda que o elevado tempo de exposição à "tela" pode prejudicar a saúde, e assim, faz-se necessária uma orientação aos professores e alunos, no sentido preventivo de danos à saúde mental.

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**PALAVRAS-CHAVE:** Educação. Pandemia. TDIC. Tempo de tela.

**RESUMEN:** Este artículo tiene como objetivo revisar, a través de la literatura, los desafíos y transformaciones que la pandemia del COVID-19 impone a la educación, los principales aportes de la formación docente a la innovación en los procesos de enseñanza y aprendizaje con el uso de TDIC y las posibles consecuencias para la salud del aumento. en tiempo de pantalla y alto comportamiento sedentario. Los resultados muestran que, dados los desafíos de la educación por la pandemia, el dominio y comprensión del conocimiento sobre el TDIC utilizado en el ámbito escolar son fundamentales para los docentes, lo que implica la necesidad de cursos de formación de docentes que apoyen la integración. de estas tecnologías en los planes de estudio y las prácticas pedagógica. Es de destacar que el largo tiempo de exposición a la "pantalla" puede perjudicar la salud, por lo que es necesario orientar a profesores y alumnos, en el sentido de prevenir daños a la salud mental.

**PALABRAS CLAVE:** Educación. Pandemia. TDIC. Tiempo de pantalla.

## Introduction

In December 2019 in Hubei province in Wuhan, China an influenza responsible for causing a syndrome called Severe Acute Respiratory Syndrome (SARS) was identified as a consequence of the disease caused by the coronavirus (COVID), thus named as COVID-19 (ISER *et al.*, 2020). In January of 2020, the World Health Organization declared a state of Public Health Emergency of international importance, at which point the COVID-19 pandemic was in place (WHO, 2020).

All pandemics have a strong social, economic and political impact, and this one was no different. With the declared pandemic and the adoption of prevention measures to contain its advance, students were prevented from attending classes in person, and in compliance with the ordinance of the Ministry of Education (MEC), 343 of March 17, 2020, education was directed from traditional face-to-face teaching to remote teaching (BRASIL, 2020).

The maintenance of school activities was and is only possible through the use of Digital Information and Communication Technologies (DICT), thus, the use of DICT has been expanded and gained *status* in all segments of society, including the educational (BRASIL, 2020). In educational institutions, teachers and students had to adapt to new resources, such as the use of virtual platforms for teaching and learning, until then used primarily by Distance Learning (DE), however, this situation has generated great challenges and tensions for the educational segment (SANTANA; SALES, 2020, p. 77), because the vast

majority of schools, teachers and students were not prepared to use the ICT and transform the home environment into work and study space.

The use of virtual learning environments was one of the alternatives that enabled the continuity of education worldwide, however, as a consequence of this, an increase in "screen time" (BOERS *et al.*, 2019) and sedentary behavior has been observed, with possible negative repercussions on health, which exalts the need for discussions in this area.

These initial considerations highlight the need for discussion about which path Education and teacher training should follow to favor the insertion of future education professionals in this process of innovation in teaching practices and the insertion of DICT in the school environment, and also what the possible impact of the use of new technologies, screen time, and high sedentary behavior on health is.

Thus, the objective of this study was to review the literature on the challenges and transformations imposed by the COVID-19 pandemic on education, the main contributions of teacher training for innovation in the teaching-learning process with the use of DICT, and the possible health consequences of increased screen time and high sedentary behavior.

## Methodological course

To answer the proposed objective, the present study methodologically appropriated in the literature review research, which according to Severino (2016, p. 102, our translation), defines by:

[...] that which is based on the available record, resulting from previous research, in printed documents, such as books, articles, theses, etc.

The databases consulted were *Scielo*, *PubMed*, Google Scholar and Bireme. The key words used in Portuguese were: teacher training; Education; Distance Education; COVID-19 and DICT, and in English Education, Distance Education, COVID-19 and DICT. For the search the key words were used isolated and/or in expressions with the use of the conjunctions "and/or". The period for searching, reading, and selecting the materials was from May 2020 to June 2021. Articles that dealt with teacher training, the use of DICT in school, and those that presented the effects of increased screen exposure time and high sedentary behavior on health were selected. Articles that after reading the abstract did not contemplate the relationship with the formative process of future education professionals, the insertion of

DICT and discussion about the consequences of screen time and high sedentary behavior on health were excluded.

### **ICT in education**

In recent years, there have been significant changes in the different segments of society, driven by the expansion of access to DICT. The popularization of technologies and the evolution of the use of DTIC favored the incorporation of digital networks in communication systems and daily actions (KENSKI, 2015).

Valente (2014, p. 79) states that John Dewey in his book "The Democracy of Education", published in the United States of America more than a century ago, criticized teaching-learning based only on the transmission of knowledge and information. The author proposed an education based on the interest and experiences that students brought to the classroom, making them protagonists of their learning. According to Borges and Oliveira (2020), in 1932, educators in Brazil, influenced by Dewey's theory, formed a movement known as New School, which intended that the formation of the student was humanized and that they participated actively in activities, consolidating their learning.

Besides Dewey, other scholars and educators, such as the Americans Carl Ransom Rogers and Joseph Donald Novack, and the Brazilian Paulo Freire, reinforced how relevant it would be to replace traditional education by one where the student is the protagonist of his learning, with the teacher only involving and motivating him, if necessary:

[...] the creation of challenges, activities, games that actually bring the skills needed for each stage, that ask for pertinent information, that offer stimulating rewards, that combine personal journeys with meaningful participation in groups, that are embedded in adaptive platforms, that recognize each student and at the same time learn from interaction, all using appropriate technologies (MORAN, 2015, p. 18, our translation).

When it comes to technologies in education, Valente (2013) cites the need to integrate DICT into the school curriculum, because the teacher will play the role of a learning agent, acting as a mediator between technology and content, so the teacher needs to know the educational functionality of computers, cell phones, and the Internet, as well as to master the tools that can be used during classes, interacting with students and acting as a learning mediator.

According to Costa (2013), for there to be integration between technologies and school contents, it is necessary the presence of DICT in teacher training, because they enable

teachers to work with technologies and face school challenges, such as those imposed by the COVID19 pandemic. According to Alonso *et al.* (2014) to teach with technologies it is necessary to learn with the technologies, collectively discuss strategies for the reconstruction of the teacher's action in a permanent movement, where everyone benefits.

Access to technologies and their use can alter the dynamics of the classroom, and bring about pedagogical changes. Thus, Valente (2013, p. 42) states that it is evident the "innovative aspects related to the use of DICT in education". For innovation in school to occur, it is essential that pedagogical practices, as well as the teaching action, reach new dimensions with respect to creating a favorable environment for communication, interaction, problem solving, in an interdisciplinary way, in order to stimulate the reasoning and development of students (ANDRADE, 2013). In this scenario, with the help of the teacher, students can develop their potential through interaction and sharing in the construction of knowledge, building new skills to achieve individual and collective autonomy.

Teaching and learning occur "in a constant symbiotic interconnection" between the "physical world and digital world", where it is not "two worlds or spaces, but an extended space, an extended classroom, which constantly merges and hybridizes. Thus, education is becoming "increasingly hybrid, because it takes place not only in the physical space of the classroom, but in the multiple spaces of everyday life, which include the digital ones" (MORAN, 2015, p. 16, translation). Teachers, in addition to face-to-face contact, will continue to communicate with their students through digital spaces, extending the classroom to other environments and spaces, making the teaching-learning process broader, deeper and more noticeable, with mobility and connectivity (BACICH; MORAN, 2015).

## Teacher formation

When analyzing the role of the teacher in relation to the teaching process, one realizes that their performance goes beyond teaching (BERALDO; MACIEL, 2016), it involves a social, dialectical, constructive and transformative function. According to Moore (2019), it is necessary to look at the "teacher" as a professional who needs constant updating and experience, given that the act of teaching is able to transfer much more than knowledge, but also experiences.

In Brazil, the training of "Education" professionals follows State norms and guidelines. Law 9.394, of December 20, 1996, known as the Law of Directives and Bases of National Education (LDBN), establishes in its Article 62 that the courses to train teachers to

work in education can be in person or at a distance (BRASIL, 1996). Paragraphs 2 and 3 of this same article discuss the use of technological resources:

Continued education and training of teaching professionals may use distance education resources and technologies. (Included by Law no. 12,056, of 2009). The initial training of teaching professionals will give preference to face-to-face teaching, subsidiarily making use of resources and technologies of distance education. (Included by Law No. 12.056, 2009) (BRASIL, 1996, translation).

The Resolution CNE/CP, No. 2, of December 20, 2019, defines the National Curriculum

Guidelines for the Initial Training of Teachers for Basic Education and establishes the Common National Base for the Initial Training of Teachers of Basic Education (BNC-Training), and in its annex are presented the general teaching competencies and the need for the search of "technological solutions for an evolution of pedagogical practices" (BRASIL, 2019, p. 13, translation). The DICT are also present in the action of planning and teaching, which should subsidize learning, and the teacher is responsible for incorporating their use in their teaching practice, with the aim of favoring learning and transforming education (BRASIL, 2020).

Among the models of teacher training, described by Jacobucci (2006), include the classic model, which consists of updates designed by the teaching-learning model; the reflective-practical model, which contemplates the practices and experiences of teachers and the emancipatory-political model, in which research-action is used as a learning strategy. And besides these models, another movement used for teacher training stands out, with the use of ICT, which has proven necessary, but challenging (SIQUEIRA; MOLON; FRANCO, 2021).

Strycer (2021) presents that the teacher to be able to use the ICT as a tool, needs integration courses with these technologies. In relation to teacher training courses in Higher Education Institutions (HEI) according to Valente, Almeida and Geraldini (2017), they need to provide learning situations that integrate DICT to their practical activities so that these future teachers can experience teaching and learning situations based on these technologies.

In contemporaneity, teachers need to have competencies and skills to conduct their pedagogical practices through DICTs (BRASIL, 2019), because the use of DICTs in education, mainly through the use of cell phones, *smartphones*, and *laptops* enable a transformation of the concepts of space and time (BERALDO; MACIEL, 2016).

Misha and Koehler (2006) to realize the need for a theory that could help in the training of teachers for the use of DICT, created the *Technological Pedagogical Content*



*Knowledge* (TPACK), translated into Portuguese as "Conhecimento do conteúdo, pedagógico e tecnológico". This theory aims to assist teachers in understanding their classes by recognizing the contexts and interactions that are involved in the teaching and learning processes, representing the integration between content, pedagogical, and technological knowledge.

The introduction of DICT in the classroom is a complex process (ALMEIDA, 2018) and, thus, they should not be used in isolation, but associated with the pedagogical knowledge of the teacher and the curricular contents, favoring the dynamics and the interaction between teachers and students. In this direction, the description of practices incorporated to DICT has been growing and the insertion of the technological context has contributed to the development of digital competence (CERVERA; MARTÍNEZ; MON, 2016), where an increase in the number of teachers using computers, *software* and the Internet in their pedagogical practice is observed (COSTA, 2020). Thus, the integration of ICT in the practices of teachers has been the subject of great interest in research, because the technological trends point to an influence of these in the way of educating (SIQUEIRA; MOLON; FRANCO, 2021).

It can thus be observed that the integration of ICT has reached the most diverse areas of education (GUZE, 2015). But how to prepare future and current teachers to integrate DICT in the classroom? Alelamait, Ihmeideh, and Alkhalwaldeh (2021) describe that offering courses for teachers in the area of technologies tends to be efficient, because they favor learning and allow putting knowledge and skills into practice.

Evaluating the educational scenario from this point of view, it is believed that knowledge about technological resources has become an obligation and emergent in teacher training courses, because every day the student arrives "more" digital.

## Education in times of pandemic

Among the impacts of the COVID-19 pandemic in the educational sphere in Brazil are the suspension of classroom activities and the use of alternatives for maintaining the teaching-learning process, mostly with the use of DICT, which aims to preserve the right of everyone to education and reduce the educational damage associated with the pandemic (FCC, 2020).

Within this context, according to a research conducted by Fundação Carlos Chagas (FCC) with the participation of Itaú social and Unesco, in 2020, since the isolation measures

were implemented in Brazil, about 39 million students (81.9%) attending basic education were removed from school chairs (FCC, 2020). In addition, data from Unesco (2020) point out that numerous educational institutions have been damaged by the context of the pandemic, resulting in the closure, leaving thousands of students without classes.

According to Aguiar, Paniago, and Cunha (2020), teachers had in a short time, a great change in their school routine, with difficulties and few resources, they were driven to adapt to the use of DICT to continue their professional activities and interactions with students, and what was once used only to complement the teaching material, has become a necessary tool in times of the COVID-19 pandemic, and with students the difficulties were no different.

However, it is known that the difficulty in accessing these technologies has had an abrupt impact on education, damaging teaching due to social inequality. The pandemic impact also affected the students, many of whom, in turn, had no access to the internet and to technologies such as computers or cell phones, which are essential resources to access the classes, making it difficult for them to learn. Some depended, primarily, on educational networks, so that they could follow the classes (GATTI, 2020).

Faced with this pandemic situation, public and private schools create expectations for the teacher's work, so that he or she can maintain the quality of their pedagogical activities during the isolation period. However, many families are unable to meet this context, since many parents are unable to monitor and stimulate their children's education, either due to lack of technological resources or also due to the lack of leveling in the parents' own education (DIAS; PINTO, 2020).

A practice that has become common in this moment was the adoption of hybrid system classes, a system that composes a mixture of remote classes with face-to-face classes, keeping the interaction through technologies (MEDEIROS *et al.*, 2020). A survey conducted in the state of São Paulo, by the University of São Paulo, with 19,221 teachers from the state network, indicates that 70% of them said they felt able to perform their work using these technologies, and of these, 51% said they felt insecure to use them in their classes (GRANDISOLI; JACOBI; MARCHINI, 2020).

According to Silva (2020), there is a desire of teachers to learn how to use digital resources, with a certain urgency, so that there is an adaptation to the moment, as an essential and important aspect for continuing education. However, this desire alone is not enough, it is necessary to recognize that there are still obstacles to be overcome, on both sides, on one side, the educational centers, which suffer with the lack of technological resources and fail to offer curricular components, such as lab classes, internships, among others, and the students, who



also face the lack of access to technological resources and experience the difficulty in learning alone, especially for those whose parents or guardians cannot accompany them in class or in doing remote activities (GATTI, 2020; DIAS; PINTO, 2020)

### **Health in times of pandemic and the influence of screen time and high sedentary behavior**

With the declaration of the pandemic by the World Health Organization (WHO, 2020), governments around the world issued decrees for the closure of trade, schools, gyms and guided the population to stay at home. Everyday activities such as shopping, going to school, attending meetings, went from a practical condition to *online*, with unprecedented impacts on human behavior (VARGO *et al.*, 2021).

The increase in *on line* activities as a consequence of the pandemic of COVID-19, favored the elevation of screen time, and here school activities stand out. With the increase in screen time, an increase in episodes of *stress*, anxiety (LEE SMITH *et al.*, 2020), depression, decreased levels of physical activity, and increased sedentary behavior (GIUNTELLA *et al.*, 2021) have been observed, each of these being responsible for health harms.

According to WHO (2017) mental disorders are common at all ages, however, during adolescence it is associated with academic (VERBOOM *et al.*, 2014) and cognitive impairment (ROCK, 2014), which can compromise the mental health of not only children and adolescents, but also adults.

In the Wang *et al.* (2020) study, conducted with 1,210 participants aged 21 to 30 years in 194 cities in China, 53.8% reported psychological impact of COVID-19 as moderate or severe, reporting moderate or severe symptoms of anxiety (28.8%), depression (16.5%), and stress (8.1%). In another work, a significant increase in psychological disturbance (anxiety, depression and stress) was demonstrated among university students in the pandemic period compared to non-pandemic periods (MAIA; DIAS, 2020).

Screen time and high sedentary behavior are associated with a range of mental and physical health harms (ALLEN; WATTER; SWANN, 2019; HUANG *et al.*, 2020). Regular physical activity is critical for health (SEVERINSEN; PERDERSEN, 2020) and disease prevention (FEALY *et al.*, 2018), with physical inactivity being related to the development of several chronic non-communicable diseases (MCGEE; HARGREAVES, 2020), and considered one of the largest modifiable (BOOTH; ROBERTS; LAYE, 2012) public health problems of the 21st century (BLAIR, 2009).

The American College of Sports Medicine (ACSM, 2020) suggested that during the pandemic of COVID-19, people continue with the regular practice of physical activity, recognizing it as essential to health. Brazilian researchers made the same placement, and called attention to the importance of regular activity practice at home or outdoors, emphasizing, also, the importance of reducing episodes of sedentary behaviors (PITANGA; BECK; PITANGA, 2020).

Reduced screen time (BOERS *et al.*, 2019) and increased levels of physical activity have been recommended for the prevention of psychological disorders and their symptoms, but it seems to us that the absence of information on these issues still prevails, which makes it difficult, in the short term, to reverse these problems.

### Final considerations

The objective of the present study was to review through literature the challenges and transformations imposed by the COVID-19 pandemic on education, the main contributions of teacher training for innovation in teaching and learning processes with the use of DICT, and the possible health consequences of increased screen time and high sedentary behavior.

Considering the challenges imposed on education by the pandemic of COVID-19, such as the use of DICT, the need to maintain the quality of the teaching and learning process in a remote format, among others, it is considered necessary for teachers to master the DICT, and for that, it is necessary that training courses add in their practices and pedagogical content the use of DICT. It is also noteworthy that the high exposure time to the screen and the high episodes of sedentary behavior, such as those observed in this time of pandemic can harm physical and mental health, being necessary and important that the Ministry of Health, Education and in general all health professionals position themselves about these situations.

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