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Challenges of concentration in the classroom after the pandemic: a literature review on the effects of screen use on elementary school students

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SUMMARY

This study analyzes the impacts of excessive use of digital technologies on the concentration of early childhood education students in the post-COVID-19 pandemic context, through a literature review. The pandemic accelerated the adoption of remote learning, exposing children to long periods of screen time and significantly affecting their cognitive, emotional, and social development. Drawing on theoretical frameworks such as those of Gardner, Goleman, Spitzer, Greenfield, Vygotsky, Papert, and Lévy, the work discusses how this overexposure influenced students' attention, memory, and motivation, in addition to highlighting pedagogical strategies that promote self-regulation, focus, and school engagement. Active methodologies and the conscious use of technologies are advocated as paths to more effective, humanized education aligned with the needs of contemporary children.

Keywords: Early childhood education; Concentration; Digital technologies; Pandemic; Neurodevelopment; Remote learning; Active methodologies; Attention; Cognitive development.

ABSTRACT

This study analyzes the impacts of excessive use of digital technologies on the concentration of early childhood education students in the post-COVID-19 pandemic context, through a literature review. The pandemic accelerated the adoption of remote learning, exposing children to long periods in front of screens and significantly affecting their cognitive, emotional, and social development. Based on theoretical frameworks such as Gardner, Goleman, Spitzer, Greenfield, Vygotsky, Papert, and Lévy, the paper discusses how this overexposure influenced students' attention, memory, and motivation, while also highlighting pedagogical strategies that foster self-regulation, focus, and school engagement. Active methodologies and the conscious use of technologies are advocated as paths toward a more effective, humanized education aligned with the needs of contemporary childhood.

Keywords: Early childhood education; concentration; Digital technologies; Pandemic; Neurodevelopment; Remote learning; Active methodologies; Attention; Cognitive development.

1. INTRODUCTION

With the arrival of the COVID-19 pandemic period, several transformations

emerged in different spheres of society, one of the most significant being

abrupt transition from in-person to remote learning. This change generated a direct impact on school routine, especially in the context of early childhood education, requiring students to suddenly adapt to the constant use of digital technologies and to prolonged screen time. The return to the in-person system revealed important behavioral and cognitive consequences, including reduced ability to concentrate, difficulty interacting and less engagement in traditional school activities, which demand continuous attention and bonds interpersonal.

Given this scenario, it becomes essential to rethink pedagogical practices in light of technological and cognitive transformations that affected child development. According to Gardner (2022), learning must consider different intelligences that make up the individual, such as interpersonal and intrapersonal intelligence, which are essential in the post-pandemic educational process, as they involve social and emotional skills harmed by isolation and excessive use of digital devices.

Complementing this perspective, Goleman (2013) emphasizes that intentional focus is one of the pillars of academic and personal success. Attention, as a trainable skill, was affected during remote teaching, requiring the adoption of strategies pedagogical practices that encourage students' concentration and active engagement. In this sense, Spitzer (2013) warns about the risks of excessive use of technology in brain development of children and adolescents, stating that the digital environment can compromise memory, empathy, and critical thinking — skills fundamental for the return to more meaningful learning.

Greenfield (2015) also points out that digital technologies are shaping new neurological patterns, altering the way the brain processes information, especially in the early stages of development. This requires a new look at teaching methodologies, as proposed by Moran (2018), when defending the use of active methodologies that prioritize student protagonism, problem-solving and the collective construction of knowledge as strategies to reintegrate the student into school environment in a critical and engaged manner.

Finally, authors such as Papert (1997) and Lévy (2010) understand that technologies, when used well, they can be allies in the teaching-learning process, since that are integrated into reflective and collaborative practices, and not just as tools passive consumption. Thus, this study aims to understand how develop the content and skills required for the age group of students

early childhood education, considering the impacts caused by the pandemic and the new educational demands arising in the post-COVID-19 context.

2.GENERAL OBJECTIVE

To analyze, through a bibliographic review, the impacts of excessive use of digital technologies in the concentration of elementary school students in the post-secondary context pandemic, highlighting pedagogical strategies that favor focus and cognitive development.

2. THEORETICAL FRAMEWORK

2.1. Panorama of Education in the Post-Pandemic Period

The COVID-19 pandemic has caused profound transformations in the educational model, forcing an abrupt transition from in-person teaching to remote and hybrid modalities. This sudden change has created significant uncertainty and challenges, not only in the field pedagogical, but also in the socio-emotional development of students and teachers. During this period, teachers and students had to quickly adapt to the use of digital technologies, often without adequate prior preparation. This adaptation directly impacted teaching and learning processes, requiring new ways of interaction, organization and attention in the virtual environment (Moran, 2018). From an emotional and cognitive point of view, school-age children were particularly affected. The lack of school interaction, the reduction in interactions social interactions and prolonged exposure to screens have significantly altered their behavior, attention and motivation to learn. Goleman (2013) highlights that the attention is an essential skill for academic and personal success, being easily compromised in highly distracting environments—such as those mediated by digital devices.

Furthermore, Gardner (2022), through the theory of multiple intelligences, reinforces that the school environment must consider the different ways of learning and developing. the absence of this environment during the pandemic affected students unequally, depending on their cognitive and social characteristics.

According to Spitzer (2013), the excessive use of digital technology, especially among children and adolescents, can lead to so-called "digital dementia", a phenomenon characterized by difficulties with concentration, memory and critical thinking. This is becomes even more relevant when considering the return to in-person classes, a time when that many students demonstrated difficulties in returning to the school routine and maintaining the focus on the proposed activities.

The uncertainty regarding the return to face-to-face classes also generated tensions for both students and for teachers, requiring efforts to readapt to a school context that was no longer more the same. For Vygotsky (2007), cognitive development is mediated by social interaction, which reinforces the importance of school as a space for construction collective knowledge — something that was compromised during social isolation.

Given this scenario, the post-pandemic educational landscape requires an analysis careful of the impacts caused by physical distancing, the virtualization of teaching, and the intense use of technologies. It is necessary to rethink pedagogical practices and consider approaches that combine technology with educational intentionality, such as point out Lévy (2010) and Papert (1997), in order to rebuild the students' bond with the learning process in a meaningful way.

2.2. Cognitive Development in Childhood

Childhood represents an essential period in human development, in which consolidate emotional, physical, social and psychological aspects that support formation of identity and cognitive skills. “These foundations influence significantly the learning experiences that will be experienced in Teaching Fundamental.”

Children's cognitive development is related to attention span, concentration and self-regulation, essential factors for academic success. Goleman (2013) highlights that attention is the basis for all other cognitive skills, being the main filter between relevant and irrelevant stimuli. Without this ability, the learning becomes fragmented and superficial.

When considering the role of attention and concentration, it is essential to turn to studies **executive functions** — a set of mental skills that include memory work, inhibitory control and cognitive flexibility. These functions are responsible for planning, organizing and directing behavior, being widely studied by contemporary neuroscience (Spitzer, 2013). The intensive use of digital technologies,

as pointed out by Greenfield (2015), can negatively affect these skills by expose the child's brain to rapid and constant stimuli, making it difficult to maintain prolonged focus on school activities.

According to Gardner (2022), it is necessary to consider that children have different ways of developing and expressing their intelligence, which demands diversified educational approaches that respect the pace of each student. The theory of multiple intelligences proposes that there is no single way to learn or process the world, which reinforces the importance of observing how concentration and cognitive development varies among students.

Vygotsky (2007), in turn, emphasizes the role of social interaction in development of higher psychological processes. According to the author, learning is a process mediated, in which the child internalizes knowledge through relationships with adults and more experienced peers. The school environment, therefore, is essential for the cognitive and emotional maturation, and the absence of this coexistence — as occurred during remote teaching during the pandemic — can negatively affect these acquisitions.

In view of the changes brought about by digital culture, Papert (1997) proposes a redefinition of learning, emphasizing the active role of the child in the face of technologies. However, as Spitzer (2013) warns, the excessive use of resources technological can compromise healthy brain development, creating difficulties in concentrating and processing information in depth.

Understanding cognitive development in childhood therefore requires an interdisciplinary approach that combines developmental psychology and pedagogy. recognize that, in addition to school content, factors such as focus, discipline and structure emotional play a decisive role in the formation of students, especially in times of digital overload and dispersion of attention.

2.3. Screen Use by School-Age Children

"Several studies conducted during the COVID-19 pandemic have identified a significant increase in screen use by school-aged children, with reports of up to more than four hours daily. This prolonged use has been associated with a variety of adverse effects — including cognitive delay, worsening emotional regulation, symptoms anxious or depressed, attention difficulties, changes in social behavior,

irritability and sleep disorders.” *(Based on studies from Oxford, UFMG and systematic reviews on the topic).*

Greenfield (2015) warns about the impact of digital technologies on the human brain, especially in children in the development phase. According to the author, the use intense screen time can alter brain structures related to attention, memory and emotional control. This "mind change," as she calls it, is related to a reduced ability to maintain focus for prolonged periods and a greater search for quick stimuli and immediate rewards.

Spitzer (2013), when addressing the concept of “digital dementia”, also reinforces the risks associated with technological overexposure, suggesting that the child's brain may be being overloaded by stimuli that do not favor critical thinking and deep learning. For the author, "the more time a child spends in front of a screen, the lower your ability to concentrate and self-control" (Spitzer, 2013, p. 49).

This scenario is especially worrying when considering the central role of attention in school learning. Goleman (2013) emphasizes that attention functions as a muscle: the more it is trained, the stronger it becomes; however, when constantly diverted by notifications and digital stimuli, this ability weakens, compromising academic performance and interpersonal relationships.

Twenge (2017), when analyzing the generation marked by hyperconnectivity — which she calls **iGen** —, points out that today's young people are growing up more connected, but less emotionally prepared to deal with frustrations and responsibilities. For her, excessive screen use is related to higher rates of anxiety, depression and social isolation among children and adolescents.

On the other hand, authors such as Papert (1997) and Lévy (2010) recognize the potential transformative of digital technologies in education, as long as their use is guided by solid pedagogical principles. Papert (1997) argues that children learn better when they are actively involved in creating with technology, and not just as passive consumers of content. Lévy (2010) introduces the concept of **cyberculture,** highlighting how technology-mediated interactions generate new forms of communication, learning and knowledge production.

Therefore, it is essential to reflect on the **balance** between the benefits and risks of use. of screens in the educational context. As Gardner (2022) argues, learning

must consider the multiple intelligences and cognitive styles of students, which involves using technological resources in a personalized and conscious way.

In short, although the use of digital devices has become a necessity in pandemic period, attention must be paid to the consequences of its excessive use in child development. More than restricting or prohibiting, the current challenge is to **educate for the critical, responsible and productive use of technologies,** ensuring that they are allies — and not obstacles — in the teaching-learning process.

2.4. Effects of Excessive Screen Use on Concentration

In contemporary times, the excessive use of digital devices has generated impacts significant in attention, ability to concentrate and cognitive performance, especially among children and adolescents. Constant exposure to visual stimuli and sound coming from screens has caused sensory overload and contributed for the increase in cases of attention deficit and distraction in school environments **(SOUZA; ALMEIDA; REIS, 2023).**

According to Goleman (2013), attention is a finite resource, which can be trained and enhanced, but also easily dispersed in the face of multiple stimuli simultaneous. The recurring practice of digital multitasking — like switching between networks social media, videos, and messaging — has hampered the ability to stay focused on single and prolonged tasks, which directly reflects in the decline in academic performance.

Spitzer (2013, p. 269) warns of the risks of so-called “digital dementia”, stating that the indiscriminate use of technology can compromise cognitive functions fundamental, such as memory, critical thinking and the ability to reflect. He states that “the constant practice of superficial activities can impede the development full of the brain, especially in school-age children and adolescents” (SPITZER, 2013, p. 269).

Greenfield (2015) also reinforces this idea by arguing that digital technologies not only shape behavior, but cause structural changes in the brain human, modifying the way we process information, make decisions and we regulate our emotions. This brain reconfiguration can make it difficult to engage in more monotonous activities, such as traditional classes, generating a cycle of dissatisfaction, inattention and constant search for immediate stimuli.

The current challenge, therefore, is to find the balance between the pedagogical use of technologies and the preservation of focused attention. Gardner (2022), when discussing his Theory of Multiple Intelligences, highlights the importance of diversifying strategies educational to contemplate different learning profiles, which may include, but not limited to the use of digital tools. Moran (2018) highlights the role of active methodologies in this process, arguing that the conscious and planned use of technologies can favor engagement, as long as it is combined with the development of self-regulation skills.

Furthermore, authors such as Papert (1997) and Lévy (2010) point out that technologies can be powerful allies in the educational process, as long as they are used in a critical and reflective, with pedagogical intentionality. However, when use becomes excessive or without mediation, a digital dependency can be established, making it difficult to self-regulation and accentuating the levels of dispersion.

Finally, Twenge (2017) argues that new, highly connected generations, demonstrate greater intolerance to boredom and less resilience in the face of challenges prolonged. This reinforces the need to think about educational practices that develop students' patience, focus, and autonomy. In this sense, Vygotsky (2007) already highlighted the role of the social environment and mediated interactions in development of higher psychological processes, including voluntary attention.

2.5. Educational Strategies to Improve Concentration

In view of the social and educational transformations intensified in the post-pandemic, it becomes urgent to adopt innovative pedagogical strategies that favor the integral development of students and promote the improvement of concentration in the classroom. The current scenario requires educators to be in constant updating, implementing pedagogical interventions that consider the new cognitive, emotional and social demands of students.

Active methodologies, such as project-based learning, problem solving, problems and the flipped classroom have proven effective in stimulating student engagement and focus. According to Moran (2018), these methodologies move the student from a passive stance to an active role in the learning process learning, promoting greater autonomy, critical thinking and ability to

self-regulation. Hybrid teaching, by integrating in-person and online activities in a planned and intentional, also contributes to diversifying stimuli and respecting the different learning rhythms (Bacich; Moran; Trevisani, 2018).

However, for learning to be truly meaningful and to happen effectively, It is essential to establish clear limits for the use of technologies, both at school and at home. Excessive and indiscriminate use of screens can impair focus and favor dispersive behavior, as warned by Spitzer (2013), who highlights the impacts of prolonged use of digital devices on higher cognitive functions.

Furthermore, Goleman (2013) reinforces that cultivating mindfulness requires environments that stimulate concentration and emotional self-regulation. He argues that attention can be trained, and that school should be a space that favors this type of development, through intentional practices that balance stimulation and focus.

In this sense, Gardner (2022) proposes a pedagogical approach that values different forms of intelligence, allowing students to engage with the content in a more meaningful and personalized way, which also contributes to the maintenance of attention.

Therefore, effective educational strategies to improve concentration should combine methodological innovation with responsible use of technologies. active mediation by the teacher, dialogue with families about digital habits and creating stimulating yet balanced learning environments are essential for students to develop the ability to maintain focus, even in the face of a hyperconnected world.

6. METHODOLOGY

This study is characterized as a qualitative research , with a focus **bibliographic.** The choice of this type of approach is justified by the need to understand, through the analysis of theoretical works and already consolidated studies, the impacts of remote teaching on the cognitive and behavioral development of children in early childhood education, especially in the post-COVID-19 pandemic context.

Bibliographic research allows the identification, selection and analysis of contributions relevant already published, offering theoretical subsidies to deepen the discussion proposal. To this end, works by authors who deal directly with the topics related to neuroscience, digital technologies, active methodologies and

child development, such as Gardner (2022), Goleman (2013), Greenfield (2015), Spitzer (2013), among others.

The sources of information used include **physical books, scientific articles, theses and dissertations,** as well as **academic digital platforms** and **databases** reliable sources, such as **Google Scholar, SciELO, CAPES Periodicals,** among others. The selection of references will follow criteria of **relevance, timeliness** and **contribution theoretical to the topic studied.**

This methodology aims not only to theoretically support the proposed discussions, but also offer subsidies for future research that wants to deepen the theme, contributing to the construction of pedagogical practices more suited to the new educational demands.

7. FINAL CONSIDERATIONS

The COVID-19 pandemic has caused profound changes in educational dynamics, highlighting the need to rethink pedagogical practices in the face of a new reality marked by the intensive use of technologies and digital overload. This study aimed to reflect, from a theoretical and qualitative approach, on the impacts of remote learning and excessive screen use on development cognitive, especially with regard to children's attention and concentration in school age.

The bibliographic analysis revealed that attention is a fundamental skill for the learning and which can be seriously compromised in high exposure contexts digital and multitasking. Authors such as Goleman (2013), Spitzer (2013) and Greenfield (2015) point to the cognitive and emotional risks related to overexposure to screens, while scholars such as Gardner (2022), Papert (1997) and Lévy (2010) defend the intentional and pedagogical use of technologies, as long as it is guided by strategies that respect the integral development of students.

In this scenario, it becomes urgent that the school acts as a critical mediator of the use of technologies, promoting the development of self-regulation, mindfulness and learning environments that respect different cognitive styles. The adoption of active methodologies and the creation of spaces for dialogue with families about habits digital are possible ways to mitigate the negative effects of digital culture, without ignore their pedagogical potential.

Therefore, this article seeks not only to deepen the discussion on the impact of time of screen on students' attention, but also provoke reflections that contribute to more conscious, balanced and effective educational practices. It is expected that results presented here can serve as a basis for new research and actions in the educational field, contributing to the construction of a school more adapted to demands of the contemporary world, without losing sight of well-being and full development of the child.

REFERENCES

GARDNER, Howard. Structures of the Mind: The Theory of Multiple Intelligences. 21st ed. Porto Alegre: Southern Medical Arts, 2022.

GOLEMAN, Daniel. Focus: Attention and its Fundamental Role in Success. Rio de Janeiro: Objetiva, 2013.

GREENFIELD, Susan. Mind change: how digital technologies are leaving their mark on our brains. New York: Random House, 2015.

LÉVY, Pierre. Cyberculture. 2nd ed.

MORAN, José Manuel. Active methodologies for innovative education. In: BACICH, Lilian; MORAN, José Manuel; TREVISANI, Fernando (Org.). Active methodologies for innovative education: a theoretical-practical approach. Porto Alegre: Penso, 2018. p. 15-33.

PAPERT, Seymour. The Children's Machine: Rethinking School in the Computer Age. Porto Alegre: Artmed, 1997.

SPITZER, Manfred. Digital Dementia: What We're Doing to Our Brains. São Paulo: Vozes, 2013.

TWENGE, Jean M. iGen: why today's super-connected kids are growing up less rebellious, more tolerant, less happy – and completely unprepared for adulthood. New York: Atria Books, 2017.

VYGOTSKY, Lev S. The Social Formation of the Mind: The Development of Higher Psychological Processes. São Paulo: Martins Fontes, 2007.