

DIGITAL GAMES AND EXECUTIVE FUNCTIONS IN SCHOOL CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD): SOME REFLECTIONS

JOGOS DIGITAIS E FUNÇÕES EXECUTIVAS EM ESCOLARES COM TRANSTORNO DO DÉFICIT DE ATENÇÃO E HIPERATIVIDADE (TDAH): ALGUMAS REFLEXÕES

JUEGOS DIGITALES Y FUNCIONES EJECUTIVAS EN ESCOLARES CON TRANSTORNO DEL DÉFICIT DE ATENCIÓN E HIPERATIVIDAD (TDAH): ALGUNAS REFLEXIONES

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Resumo

Neste artigo buscamos refletir sobre os jogos digitais e as possibilidades de desenvolvimento das Funções Executivas (FE) em escolares com Transtorno do Déficit de Atenção e Hiperatividade/Impulsividade (TDAH). Seguimos uma abordagem qualitativa e realizamos uma revisão de literatura a partir de textos produzidos no período de 2012 a 2018. Para esse fim, selecionamos alguns pesquisadores que estudam os jogos digitais e o desenvolvimento das Funções Executivas em escolares com o TDAH, com destaque para os estudos de Alves (2016); Tourinho, Bonfim e Alves (2016); Rodrigues (2014), os quais abordam o uso de jogos como recurso de desenvolvimento das FE, a partir de uma perspectiva neuropsicológica. Os autores apontam em suas pesquisas que a integração mediada dos jogos digitais no cotidiano da sala de aula pode possibilitar outros percursos para as aprendizagens dos alunos e, por conseguinte, ampliar o desenvolvimento das Funções Executivas em escolares que têm o TDAH, frente ao contexto tecnológico atual. Os jogos digitais não são os únicos recursos que podem contribuir com o desenvolvimento das FE em escolares com o Transtorno do Déficit de Atenção e Hiperatividade, mas os estudos apontam que esses podem sim colaborar para que as crianças avancem a partir das suas contribuições, no desempenho das habilidades executivas do seu funcionamento neuronal, uma vez mediados por professores que planejam suas ações e que tenham objetivos bem definidos.

Palavras-chave: Jogos digitais. Funções Executivas. TDAH.

Abstract

In this article we seek to reflect on the digital games and the possibilities of development of the Executive Functions (FE) in schoolchildren with Attention Deficit Hyperactivity Disorder (ADHD). We followed a qualitative approach and carried out a literature review from texts produced in the period from 2012 to 2018. To this end, we selected some researchers who study digital games and

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the development of Executive Functions in students with ADHD, studies by Alves (2016); Tourinho, Bonfim and Alves (2016); Rodrigues (2014), who discuss the use of games as a resource for the development of FE, from a neuropsychological perspective. The authors point out in their research that the mediated integration of digital games into the classroom everyday can enable other paths for students' learning and, consequently, to extend the development of Executive Functions in students who have ADHD, compared to the technological context current. Digital games are not the only resources that can contribute to the development of EFs in schoolchildren with Attention Deficit Disorder and Hyperactivity Disorder, but studies suggest that they can help children advance from their contributions to performance of the executive abilities of their neuronal functioning, once mediated by teachers who plan their actions and have well defined goals.

Keywords: Digital games. Executive Functions. ADHD.

Resumen

En este artículo buscamos reflexionar sobre los juegos digitales y las posibilidades de desarrollo de las Funciones Ejecutivas (FE) en escolares con Trastorno del Déficit de Atención y Hiperactividad/ Impulsividad (TDAH). Seguimos un abordaje cualitativo y realizamos una revisión de literatura a partir de textos producidos en el período de 2012 a 2018. A ese fin, seleccionamos a algunos investigadores que estudian los juegos digitales y el desarrollo de las Funciones Ejecutivas en escolares con el TDAH, con destaque para los estudios de Alves (2016); Tourinho Bonfim y Ahmed (2016); Rodrigues (2014), los cuales abordan el uso de juegos como recurso de desarrollo de las FE, desde una perspectiva neuropsicológica. Los autores apuntan en sus investigaciones que la integración mediada de los juegos digitales en el cotidiano del aula puede posibilitar otros recorridos para los aprendizajes de los alumnos y, por consiguiente, ampliar el desarrollo de las Funciones Ejecutivas en escolares que tienen el TDAH, frente al contexto tecnológico actual. Los juegos digitales no son los únicos recursos que pueden contribuir con el desarrollo de las FE en escolares con el trastorno del déficit de atención y la hiperactividad, pero los estudios apuntan que estos pueden sí colaborar para que los niños avancen a partir de sus contribuciones, en el desempeño de las habilidades ejecutivas de su funcionamiento neuronal, una vez mediados por profesores que planean sus acciones y que tengan objetivos bien definidos.

Palabras claves: Juegos digitales. Funciones Ejecutivas. TDAH.

Introduction

The Attention Deficit Hyperactivity Disorder (ADHD) is characterized by an alteration in the neurodevelopment, directly integrated with a persistent pattern of symptoms related to inattention, hyperactivity and / or impulsivity, incompatible with the level of the subject's typical development (MATTOS, 2003). According to the diagnostic criteria, the manifestation of symptoms negatively affects the individual's functionality in at least two or more environments in which the subject attends, such as school, home, groups of friends, etc.

ADHD can alter the functioning of the subject's Executive Functions (EF); these being

a set of higher-level cognitive skills, which allow the guidance and management of cognitive and behavioral processes. Consequently, the execution of various tasks that we perform in our daily lives depends, exponentially, on the development of our Executive Functions. The decision-making, self-monitoring and planning process to achieve the objectives is part of the complexity which it is the executive functioning.

Considering that EF can be altered in children and adolescents with ADHD, which can negatively impact their schooling process, recent studies indicate that interventions performed with the use of digital games as an instrument to stimulate EF, in the context of the classroom can contribute to the development of these subjects. Therefore, we emphasize that they are used with the appropriate mediation of qualified teachers for this performance. This qualification presupposes that teachers know how to handle technological devices properly, understanding them as instruments capable of enhancing the development of students, as well as selecting games that can contribute to this development, using them properly.

Methodological Path

This research follows a qualitative approach and was carried out from a literature review based on texts produced in the period from 2012 to 2018, about digital games and the development of Executive Functions in students with ADHD, with emphasis on studies of Alves (2016); Tourinho, Bonfim and Alves (2016); Rodrigues (2014), who approach the use of games as a resource for the development of EF, from a neuropsychological perspective.

For these authors, digital games are resources / strategies that can be used in the classroom in order to enhance the teaching and learning process of the students, as the digital games increase the child's interactive possibilities with the content through games. Starting from the premise that children and young people have greater ease with the use of new technologies, for being born in a highly technological era, we show the importance of the teacher knowing and integrating these strategies in his or her classes.

The results point out that the mediated integration of digital games in the classroom's daily life can also expand the development of Executive Functions in the children, improving their attention focus, as well as inhibitory control, working memory, planning capacity and cognitive flexibility.

In our journey, we collected information by accessing productions available in scielo and google academic, and in book chapters, considering the following keywords: Digital Games, Executive Functions and ADHD, and the analysis of the results was based on content analysis. According to Olabuenaga and Ispizúa (1989), content analysis is a technique for reading and interpreting the content of all kinds of documents, which, when properly analyzed, open the door to knowledge of aspects and phenomena of social life that are otherwise inaccessible. Thus, we seek to analyze the results of the researches studied.

We postulate that digital games mediated in the classroom can increase the strengthening of cognitive functions, and this can mean a challenge (s) that crosses teaching practices with the subjects seen here. Thereby, in this text we aim to share how scholars have been unveiling this process, considering it important for the learning of children with the disorder.

Attention Deficit Hyperactivity Disorder (ADHD): characteristics, diagnosis and school inclusion

It is common to hear of children who are unable to stand still, who are too restless, who talk excessively, who are always in danger or getting into trouble; or those who are distracted, fail to focus attention and lose concentration at the slightest of stimuli. Children who may have learning difficulties or disorders, in school and in relationship contexts, especially with their peers, and also difficulties in complying with rules and obeying limits. For being so, they receive several classifications, such as: rebels, lazy, undisciplined, ill-educated, or who live “in the world of the moon”, among others. We also hear about adults who cannot be organized, very impatient, who speak without thinking, impulsive, with a lot of creativity, who initiate several activities at the same time, but do not complete them, have difficulty in maintaining a relationship for a long time and, commonly, forget important commitments.

All of the aforementioned characteristics, depending on the constancy and amplitude with which they occur, as well as the moment and intensity in which they appear in the course of neurodevelopment⁴, can be configured as Attention Deficit Hyperactivity Disorder

⁴ Development of the nervous system, including motor skills, manipulation, sensory skills, communication and language, behaviors, cognitive skills, affects and emotions.

(ADHD). According to the DSM-V⁵ Diagnostic and Statistical Manual for Mental Disorders (2014), ADHD can be subdivided into three types: attention deficit disorder with a predominance of the inattention symptom; attention deficit disorder with a predominance of the symptom of hyperactivity; combined attention deficit disorder, in which both symptoms manifest (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

Related to inattention, we can mention the following characteristics: not paying attention to details, difficulties to concentrate, not paying attention to what is said, difficulty following rules and instructions, diverting attention when facing other activities, not completing what starts, disorganization, avoids activities that require continued mental effort, loses important things, gets easily distracted by things outside of what you are doing (including your own thinking), forgets tasks and commitments, gets bored with complex tasks, forgetting them. Related to hyperactivity and impulsivity are: moving your hands or feet when sitting, not sitting for too long, jumping and running excessively in inappropriate situations, internal feeling of restlessness, being noisy in playful activities, constant agitation, talking too much, answering questions before they are completed, difficulty waiting for your turn, meddling in other people's conversations or games (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

ADHD symptoms appear in early childhood and can accompany the subject for life. The DSM-5⁶ considers ADHD as a neurodevelopmental disorder and assesses that for a diagnosis to be configured as ADHD, the signs must appear in childhood, before the age of 12, interfering in all dimensions of the subject (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

The diagnosis of ADHD is clinical and can be made by a multidisciplinary team composed of a psychiatrist, psychologist, psychopedagogue and speech therapist. The Diagnostic assessment in childhood should involve parents, other family members and the school, in order to understand the individual's own personal history of life, from the most varied angles of their existence: school, professional, family, affective and social (CUNHA, 2012).

⁵ Published by the American Psychiatric Association (APA), the Diagnostic and Statistical Manual of Mental Disorders (DSM) is the official device for tracing psychiatric diagnoses in the United States, being used on a large scale in the world and, thus, having a great influence on the International Classification of Mental Disorders of the World Health Organization (WHO)

⁶ DSM-5, ADHD is classified among neurodevelopmental disorders, which are characterized by developmental difficulties that manifest early and influence personal, social or academic functioning

The diagnostic evaluation process necessarily involves the collection of data from the parents and the child or adolescent. In addition to the family, contact with educators has been shown to be very relevant clinically, since the teacher has frequent and daily contact with the child or adolescent, being able to talk about his impressions about behavior in the school environment. The children's past history and development in the context of their family, culture and community must be carefully collected (ROTTA; BRITI; FILHO, 2016).

Still According to the DSM-5, the diagnostic criteria point out that it is necessary that the attention difficulties are expressed through difficulties in paying attention in details or in the continuity of tasks: difficulties in maintaining attention in academic or playful tasks, difficulty in organizing tasks, with poor time management, difficulty in maintaining the order of objects and sequential tasks, avoiding tasks that require prolonged mental persistence, easy distraction by external stimuli and difficulties, due to forgetfulness, in frequent daily activities. These symptoms must be present in more than one environment and interfere with social, academic or professional functioning, or reduce their quality. We observed that it is also necessary that this disorder is not due to some other mental disorder (AMERICAN PSYCHIATRIC ASSOCIATION, 2014).

The number of people with ADHD is distributed in the population, equally in the social and economic classes, even in countries of different cultures, like the United States, Japan and India. Studies indicate that there is a seven times higher incidence in family members with a member with the disorder than in families that have no incidence (LOPES, 2011). The World Health Organization (WHO) estimates that between 2.5 and 5% of adults, in most cultures, suffer the consequences of this disorder in their daily lives (ROTTA; BRITI; FILHO, 2016).

Early diagnosis and appropriate treatment can significantly reduce conflicts in the family, at school and in all social groups of which the subject is a part. In this sense, we consider ensuring the security of individual rights, especially in relation to the acceptance of correctly specialized interventions. Despite this, caution is needed, as the wrong diagnosis can often occur and it is important to visualize other aspects of the educational process and / or family dynamics that may impair the learning process.

Among all the difficulties presented by most children diagnosed with ADHD, we can mention the different subcomponents of attention, which are: focused, selective, sustained and alternating attention, and Executive Functions (TOURINHO; BONFIM; ALVES, 2016).

Executive Functions and ADHD

The execution of various tasks that we perform in our daily lives depends, exponentially, on the development of our Executive Functions. Our decision-making, our behavior, how we plan to achieve our goals, etc. depend on them. Executive Functions, according to Rotta, Ohlweiler and Riesgo (2016), are a set of functions responsible for starting and developing an activity with the determined final intention. Part of the Executive Functions (FE) is a broad spectrum of cognitive processes, with emphasis on the manipulation of mental information, the ability to inhibit responses - related to self-monitoring and cognitive flexibility. Therefore, they can be considered as a management system for cognitive-emotional resources, whose task would be the resolution of problem.

EFs involve voluntary, self-organized and independent actions, directed to specific objectives. These cognitive processes, among other functions, are present at all times of information processing and, consequently, changes can affect the child's learning (TOURINHO; BONFIM; ALVES, 2016).

EFs are organized in the course of life, following an order that goes from less to greater complexity, from the initial link to autonomy. We, humans, are not born with the ability to plan, organize, memorize, etc. Therefore, there is a need for these capacities to be organized during the development process by interacting with their social environment, so that one step depends on the previous one. This is also the case in children's school life, as they learn one thing at a time, and one learning process will support the other.

Barkley (2008) signals new ways of understanding Attention Deficit Hyperactivity Disorder, pointing out the importance of developing Executive Functions in the subject to improve his/her school performance. The disorder caused by ADHD in school learning can be intense: low academic performance is possible, even if the child has preserved the general cognitive skills to learn in a fluid way, considering what is expected for their age and level of schooling. These children are generally more vulnerable to “school failure” compared to children who do not have the disorder. As an example, studies (SIQUEIRA; GURGEL-GIANNETTI, 2011) point out that 35% of subjects with ADHD spend less time in school, 30% have a history of repetition and 46% have a history of suspension from school activities or expulsion from school. Educational institutions.

We understand that the teacher has a fundamental role in the learning process of a student with a neurodevelopmental disorder. Pedagogical work plays a fundamental role in the effort to transform the classroom, in order to make it a place of dialogue, respect, harmonious coexistence, imagination, development of potential and construction of knowledge for all people, without distinction. So, each subject is unique, and valuing this is fundamental for the realization of a practice that benefits each child in their development and its learning potential.

For this reason, initial and continuing teacher training is a decisive factor for an efficient performance and for the inclusion of all students in the school. Learning difficulties do not diminish if students do not have qualified teachers, who understand them and are able to assist in the process of overcoming difficulties and limitations, seeking to innovate their methodologies and adapt the content according to the specific needs that each subject presents.

Innovative methodological practices can influence the development of EF in all students, including those who have ADHD. These practices must be contextualized, respecting the learning time of each student and their specific interests. Among several instruments that can corroborate for students' learning, we can mention the digital ones⁷, such as the computer, cell phone etc.

Digital games as pedagogical instruments

The results of research by Rodrigues (2014), Coutinho (2016), Neves (2010), Tourinho, Bonfim and Alves (2016) point out that there is a positive relationship between digital games and classroom learning, when mediation is done in a planned way and, thus, with objectives to be achieved.

The advancement of new technologies has influenced pedagogical models and, consequently, the relationship among the school, teachers and students has changed. With technologies, the teacher can migrate from the place of knowledge holder, becoming the one who stimulates the student to know, considering the constant challenge in teaching practice, giving a new meaning to his/her performance.

⁷ Rosalina Lynn Alves (2008; 2016) developed studies from another perspective, but with expressive results in the relationship between games and learning.

For researcher Rodrigues (2014), family members and teachers who do not know the educational value of electronic games tend to identify only those aspects related to fun or distraction that, in this line of reasoning, would not contribute to the child's education. In fact, technological misuse can cause problems in the child's educational development. It is related to the use of non-educational games, that is, those that do not have an ethical character and respect for human life and development, or even excessive use, without adult supervision.

Rodrigues (2014) warns that technological evolution brings to digital games diverse possibilities that enchant and attract its users, developing skills that can significantly interfere in the learning and development of the player's potential. Despite this, the author warns of the need to be careful with the form and intensity of the use of these resources, so that such stimuli do not become harmful, in normal terms, without rules and time limits for play, which prevent the child from doing other important things, such as school, artistic and sports activities, among others.

According to Coutinho (2016), in 2013, 621 digital games for education and 698 for entertainment were produced in the Brazilian industry. Of these, there are those created to work with the most diverse areas of knowledge, among which: portuguese, mathematics, history, human values, society, rules of social coexistence, etc. In a simple access to the internet, we easily find a variety of games to play freely. Given this data, the question arises: how can the child learn from digital games? According to the author, this is not a simple answer, as there is still little research in the area and there are no consolidated methods for using these resources. However, even for the author, when using digital games in the classroom, the teacher has many gains, such as the attention and involvement of the students with the class, since they feel motivated due to the use of the technological apparatus, as well as the increase in the level of attention and concentration.

Coutinho states that “digital games are taken as new objects of a culture” (COUTINHO, 2016, p.18), since the digital game is in the children's lives because it is in society, and it is in society in an increasingly more intense, because it is in the lives of children and adults. For having an interdisciplinary character, digital games are beyond school disciplines and knowledge, not constituting a monopoly of any of them, but integrating them.

According to Rodrigues' studies (2014), games and digital activities have great dazzle and can cause some influence (harmful?) On the behavior of children and adolescents who

spend a lot of time in their day in this play, because playing is one of the elements that constitutes childhood. However, well-directed games can present, as a consequence of their use, logical reasoning, the development of strategies and visual and motor coordination, in addition to specific skills and potential that stimulate the player's concentration and cognitive development.

The digital game is not superior, in terms of quality, when compared to other games, but it is also not inferior and, in this case, we can say that each one has its importance. Neves' studies (2010) confirm that the digital game seduces, is attractive, since it challenges, allows users to sharpen their senses, creating strategies, raising hypotheses and abusing reasoning, the ability to solve problems, requires the participant invent, create and be dynamic. All of this can happen without causing suffering to the player, considering the playful, sociable, engaging, collaborative and interactive context of the game subsidized by new technologies.

Neves (2010) infers that games should permeate all spaces of the human being's life, mainly at school, due to the fun and joyful dynamics that they propose, as they are always contemporary, they are in continuous movement together with man and with history. It is in this context of digital and technological reality that we realize the need for the school to reflect on the integration / articulation of the teaching and learning processes with this technology.

The school can be a place where games would be present, considering the functionality they would bring to students. This can occur, considering that the teacher incorporates such technologies in the classroom and, in addition, has clear and objective intentions when using the technologies in the classroom. However, the limits and difficulties of the teacher to understand and incorporate this new culture in the school context must be discussed. It is necessary to invest in public educational policies aimed at teacher training in the perspective of inserting digital culture in schools and pedagogical works.

Corroborating this thought, Tourinho, Bonfim and Alves (2016) point out that good video games incorporate good learning principles, principles supported by current research in Cognitive Science. Thus, the field of study related to games has been aggregating in several areas and following this trend; pedagogy and psychology has shown increasing interest, both in the national and international scenario, seeking to deepen the possible contributions from the games to develop skills, including cognitive ones, such as planning,

cognitive flexibility, working memory, selective and sustained attention, inhibitory control and monitoring, processes that make up the Executive Functions.

Final Considerations

Studies show that when digital games are used in a planned way and with a determined frequency, there may be an improvement in the executive functioning of schoolchildren with ADHD, especially with regard to the executive function regarding working memory, as this is fundamental for the comprehension of read texts, to retain and associate the information contained therein. However, we note that, even living in a highly digital age, the training of teachers and professionals working in specialized educational services is insufficient with regard to the use of digital games as a tool for training skills related to the development of students with ADHD. We emphasize that digital games are not the only ones, nor the most important resources for training Executive Function skills, however they are another instrument that can and should be used for their stimulation, in the context of the classroom.

Thus, we recognize the need for training for all school professionals, focusing on a proposal that is adequate to current demands, taking into account the context in which students live in the digital age. For this reason, we emphasize that in the training of teachers the access, use and integration of New Technologies are guaranteed, in this case, the digital game, in favor of guaranteeing the rights and equalization of opportunities for everyone, indistinctly.

The results found in the visited texts point out that the mediated integration of digital games in the daily life of the classroom can provide several paths for learning and, therefore, expand the development of executive functions in children, according to the authors. The digital games used by teachers, in a planned way and with well-defined objectives, can expand the development of attention, planning, inhibitory control, working memory, among other functions in children with ADHD, helping them to become increasingly functional.

It is in this scenario that we understand the context of educational activity, teacher training, working conditions and public policies for effective inclusion as dimensions that lack studies and investments around the issue of learning integrated with technologies, and also the potentialities that they point to minimize the exclusion process and seek the right

to quality education that includes with equity.

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Article received on: April 4, 2019
Approved on: May 29, 2019

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