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Traditional and digital pedagogical games: tools for stimulating the cognitive development of students with learning difficulties *Traditional and digital pedagogical games: tools for stimulating cognitive development of students with learning disabilities*

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Summary

The study of this research is related to traditional and digital pedagogical games and the cognitive development of students with learning difficulties. The objective of this was to determine whether stimulation through pedagogical and digital games makes it possible to improve the cognitive development of students with learning difficulties. The research methodology was qualitative, with an exploratory focus. Data collection took place using the case study method. The interview was the primary data collection instrument and bibliographic and documentary references were the secondary instruments. The investigation took place with a sample of 11 students from the Silvio Micheluzzi State Public Elementary School in the municipality of Ji-Paraná, in the State of Rondônia, Brazil. The results of the investigation showed that students improved their basic cognitive skills, demonstrating greater agility in the development of activities, better optimization in the time for fixing attention and concentration, improvement in the quality of immediate and long-term memory, optimization of perception and logical reasoning, greater autonomy in decision making and problem solving.

Key words: Cognitive development. Learning difficulty. Traditional and digital pedagogical games.

Abstract

The study of this research is related to traditional and digital pedagogical games and the cognitive development of students with learning difficulties. The objective of this study was to determine if stimulation through pedagogical and digital games enables the improvement of the

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cognitive development of students with learning difficulties. The research methodology was qualitative, with an exploratory focus. Data collection was done through the case study method. The interview was the primary data collection instrument and bibliographic and documentary references were the secondary instruments. The investigation took place with a sample of 11 students from the State Public School of Elementary Education Silvio Micheluzzi in the city of Ji-Paraná, in the State of Rondônia, Brazil. The results of the investigation showed that students improved basic cognitive skills, demonstrating greater agility in the development of activities, better optimization in the time of fixing attention and concentration, improvement in the quality of immediate and long-term memory, optimization of perception and logic reasoning, and greater autonomy in decision making and problem solving.

Keywords: Cognitive development. Learning difficulties. Traditional and digital educational games.

1. Introduction

This article aims to study the use of traditional and digital pedagogical games in the cognitive development of students with learning difficulties.

Learning is a natural human phenomenon and involves a series of factors in a continuous process; among them, cognitive, emotional, organic, psychosocial and cultural aspects in which competencies, behaviors, skills, knowledge and values are acquired or modified through experiences, observation, study and reasoning. In other words, a process of acquiring knowledge or actions based on interaction with the environment and society, where different capabilities and previous experiences are considered.

According to Topczewski, (2002), cited by Sampaio and Freitas (2014, p.17), “[...] learning can be translated as the capacity and possibility that people have to perceive, know, understand and retain in memory the information obtained”, and refer to learning difficulties as performance below expectations for their age in the academic area in aspects that require reading, writing and calculation.

From this context, it is considered that any factor that alters the natural course of this process will result in a problem in the acquisition of school learning, and the obstacle in the learning process can be caused by cultural, cognitive, emotional reasons, inappropriate methodology, inadequate teacher teaching, leading to the need to learn differently, compared to other students, who are learning according to the methodology applied in the classroom. As Visca (1991, p. 52, apud SAMPAIO, 2011, p. 107) explains, “No one can learn above the level of the cognitive structure they have.”

The learning problem can be considered as a symptom, since not learning does not constitute a permanent condition, but rather a sign of decompensation. Hence the importance of knowing and understanding the specific problem, strengths and weaknesses; and seek support strategies that allow the compensation of difficulties and optimization of the learning development process. Therefore, “[...] the earlier the support intervention, the better the result will be in dealing with learning difficulties.” (GÓMEZ E TERÁN, 2011, p. 95).

It is known that stimulation, variety, interest, concentration and motivation are equally provided by the playful situation, associated with motivating, directed and interventional activities in a pleasant environment. In this context, Dalmolin and Piovani (2014, p. 07) make reference to Moyles (2002), stating that:

[...] the game is recognized as a means of providing children with a pleasant, motivating, planned and enriched environment, which enables the learning of various skills. And educational games with pedagogical purposes reveal their importance, as they promote teaching-learning situations and increase the construction of knowledge, introducing playful and pleasurable activities, developing the capacity for initiation and active and motivating action.

Thus, games, toys and activities are essential for balanced and healthy development in childhood; Therefore, the importance of including traditional and digital games in interventional activities in the development of children's learning, providing opportunities for them to experience different situations, instigating in a pleasant way the development of the capabilities and skills necessary to improve cognitive functioning. Therefore, they are important and useful tools in the school context and in any social context, considered as connective, interactive, mediating and interventional possibilities in the learning process.

2Conceptualization of cognition, cognitive development and learning process

According to the CogniFit website (2020, sp)^{two}, “[...] the term “cognition” comes from the Latin root *cognoscere*, which means 'to know'.” Therefore, when we talk about cognition, it refers to everything related to knowledge, consequently to learning and experiences since childhood.

^{two}Available at: <https://www.cognifit.com/br/cognicao>.

Brites (2019, s/p.) in a publication on the website neurosaber.com.br, describes cognition as: “[...] act that consists of processing information. The function of this ability is to perceive, integrate, understand and respond appropriately to all stimuli in a person's environment.”

Cognitive development is an area of study that seeks to understand how the learning process takes place from childhood. It is a form of adaptation to the environment, which begins at birth and evolves, following growth and maturity; a process that permanently transforms with the different interactions that the person establishes, these being called by Gómez and Terán (2011, p. 46) as “[...] key moments in which stimulation allows some functions to appear and become develop [...]”. In this context, conceptualizing the learning process, Wajnsztej and Wajnsztej (2009, p. 28) state that: “Learning is a process through which the child actively appropriates the content of human experience, of what their social group knows. For children to learn, they need to interact with other human beings.”

Thus, it is understood that learning is a construction not only of intelligence and knowledge, but also of personal identification, relationships and interaction between people throughout life.

2.1 The relationship between cognitive development and learning

According to Becker (2013, p. 83), “learning depends entirely on development; its possibilities are opened or limited by cognitive and affective development”. It is therefore understood that, for learning and development to occur, there must be a process of mutual construction based on properly organized interactions.

This context is clarified by Vygotsky (2000, p. 103) when he states that, “[...] learning is not development; however, properly organized learning results in mental development. Therefore, learning provides greater opportunities for development.”

2.1.1 The Contributions of Jean Piaget

Piaget (1947) was the most influential name in the field of education, causing repercussions, especially in genetic psychology, which investigates the cognitive development of children from birth to adolescence.

Through his studies in the field of biology, he concluded that biological development is a process of adaptation to the environment in which the individual lives, which depends on his maturation as much as on the conditions of that environment. The scientist takes this conception to studies on human development, especially cognitive development. (VIEIRA; LINO, 2007 apud LIMA, 2012, p.199)

This organism-environment change, which occurs all the time in various directions, is called by the author the process of adaptation, which occurs in the interaction between subject and object.

Assimilation, according to Piaget (1947, p. 13) “[...] is the action [sic] of the organism on the objects [sic] that surround it, to the extent that this action depends on previous behaviors in relation to them objects [sic] or similar.” That is, when new information is incorporated into existing schemes.

Accommodation, according to Piaget (1947, p. 13), “[...] is the complementary process, through which the individual adjusts – accommodates – to an event in the environment, depending on its structures.” Therefore, in accommodation, new information is not only assimilated or internalized, but undergoes a modification in the knowledge already acquired.

Therefore, intelligence results from adaptation and balance between the processes of assimilation and accommodation in the face of our interactions with the environment, “[...] a continuous passage from a state of lower balance to a state of higher balance” (PIAGET, 1994, p. 13).

For the author, intelligence is the most specific expression of this adaptation behavior, consisting of the individual capacity to adapt to the environment, and, in this way, the cognitive process would develop in stages, until reaching the adult level of logical reasoning, involving four periods of development in a sequential manner, considering biological determinants. There are four stages described by Piaget (1995), according to Leão (2013):

- Sensorimotor Period (birth to 2 years):
- Preoperative Period (2 years to 7 years):
- Period of concrete operations (7 years to 12 years):

None of the stages mentioned above can be omitted or skipped; in this context, as stated by Wajnsztein (2009, p. 28), “[...] although there is a certain age limit to reach each

of the stages, there may be changes around the average pattern, depending on genetic factors and specific experiences of the individual.”

2.1.2 Henri Wallon's Contributions

Henri Paul Hyacinthe Wallon (1879-1962), dedicated himself to studying the development of the child as a complete being, with its affective, cognitive and motor aspects, with the aim of promoting as much as possible the development of individual skills and the formation of citizens .

Wallon became known for his scientific work on Developmental Psychology. He created the theory called “Psychogenesis of the Complete Person”. “In this theory, he proposed the study of the child from a holistic perspective, insisting on the knowledge of the child as a complete being, thus breaking Cartesian dualism” (DAUTRO; LIMA, 2019, p. 6).

Thus, one of Wallon's most significant contributions to education was to highlight that cognitive development and affectivity are directly related, that is, that the first expressive forms of human beings are of an emotional nature and constitute the basis for cognition, highlighting thus the central occupation of the affective dimension, both from the point of view of the construction of the person and of knowledge.

Wallon, (2005), like Piaget, divides development into phases, however, he believes in a dialectical and interactionist development, in which the stages are not linear, and there may be advances and setbacks between them; thus shows that:

It is against Nature to treat children in fragments. At each age, it constitutes an inseparable and original whole. In the succession of ages, she is a single and same being in the course of metamorphoses. Made of contrasts and conflicts, its unity will therefore be even more susceptible to developments and novelty (WALLON, 2005, p. 215, *apud* SUGAHARA, 2008, p. 33).

Thus, the five stages of human development were described by Wallon, in order to establish a possible sequence of stages without disregarding completeness, but understanding that each stage is prepared by the previous one and prepares the subsequent one, always integrating new learning into old ones. .

- Stage I - Impulsive and emotional (0 to 1 year):
- Stage II - Sensorimotor and Projective (1 to 3 years):
- Stage III - Personalism (3 to 6 years):
- Stage IV - Category (6 to 11 years):

- Stage V - Puberty and adolescence (over 11 years old);

In this context, it is considered that the elements of affectivity, movement, knowledge and construction of the self as a person and physical space are found together, however, throughout development there are successive differentiations between the functional fields.

2.1.3 Lev Vygotsky's Contributions

Lev Semenovich Vygotsky (1896-1934), centered his research on understanding human mental processes, concluding that culture shapes the psychological and determines the way of thinking; that is, people from different cultures have different psychological profiles.

The central issue of his theory is the acquisition of knowledge through the subject's interaction with the environment. And referring to the socio-historical process, the idea of learning developed by Vygotsky includes:

[...] the independence of the individuals involved in the process. The term he uses in Russian "Obuchenic" means something like: teaching and learning process, always including the one who learns, the one who teaches, and the relationship between these people. (OLIVEIRA, 1997 p.57 *apud* CUNHA, 2014, p. 77, emphasis added).

It thus configures an important concept in their research; the different levels of development, classified into three important moments of human learning: zone of potential development, zone of real development and zone of proximal development, described by Vygotsky (1984), cited by Ferrari (2014, p. 29-30), as:

Zone of potential development: is any activity and/or knowledge that the child has not yet mastered, but is expected to be able to know and/or carry out, regardless of the culture in which they are inserted.

Zone of real development: it is everything that the child is capable of achieving alone, achievements that have already been consolidated, mental processes that have already been established; development cycles that had already been completed.

Zone of proximal development: is the distance between what the child can already accomplish alone and what they are only capable of developing with the help of another person.

Thus, Vygotsky works with the mediating function between the role of work instruments in the transformation and control of nature, and the role of signs as psychological instruments in human activity, which enable more efficient functional performances.

2.1.4 Main Cognitive Processes

Cognitive processes are classified into two categories: basic and higher. Basic cognitive processes allow us to carry out everyday tasks, such as shopping at the supermarket, calculating bills, checking the time, etc. Higher cognitive processes are more complex and require greater effort from the mind, such as learning another language, reflecting on a text, solving problems at work, writing a thesis, etc.

In this way, there is a range of processes, throughout development, that complete each other and form a full cognitive structure. However, perception is the gateway to stimuli that will be processed cognitively, “[...] it is the process that allows us to recognize, organize and understand the information that arrives through the senses.” (FERRONATO; FREITAS; PINTO, 2016, p. 160)

Attention is present and actively participates in human conduct, from the input of the stimulus to the motor response, it is a fundamental and extremely important basic cognitive process, as it involves the brain's disposition to receive stimuli, because: “[...] thanks to it we can become aware of what is happening in our environment, selecting only those stimuli that will be useful and leaving aside those that will not be useful at certain times.” (GLOVER, 2019b, s/p.).

Memory is an extremely important basic cognitive process because it has the function of receiving, interpreting and storing all the information that reaches our brain. According to Ramos (2014, sp), “[...] it is a facilitation of a neural pathway, which reproduces a perception, whether visual, auditory, tactile, olfactory or integrative.” It is an essential cognitive process for the development of learning, as it allows us to remember our past, therefore: “Without it, each experience would be experienced as something new; life would be a series of meaningless encounters that bear no relation to the past and would be of no use for the future.” (GOMÉZ; TERÁN, 2011, p. 56).

Memory can be classified according to the storage time of stored information and content, related to short-term memory and long-term memory.

Language is one of the higher processes that requires the coordination of various functions and skills. It is gradually formed since birth, remaining in constant modification; it is linked to brain evolution and maturation and does not occur as an isolated fact:

[...] occurs closely related to processes in psychomotor development and cognitive evolution. In addition, higher nervous functions, interaction with the environment, social and cultural, affective and emotional factors and thinking intervene. (GOMÉZ; TERÁN, 2011, p. 57).

Sequencing the main cognitive processes, metacognition also stands out, that is, the knowledge that the subject has about their own strengths and limitations, conceptualized by Flavell (1979, p. 232), as:

[...] the knowledge that each person has of their own cognitive processes and products or any aspect related to them; it involves active monitoring and consequent regulation of these processes in relation to cognition, usually in the service of some concrete goal.

Thus, as language and metacognition, problem solving and reasoning are skills developed concomitantly from early childhood, and as cognitive processes are matured and structured progressively, through affectivity, motivation and intervention in the search for alternative solutions to a conflict through games and activities in the child's daily life.

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2.2 The influence of traditional and digital educational games in stimulating cognitive development in children

For the game to have the configuration of pedagogical material, it must perform educational functions, as well as aim to seek results in relation to learning and skill development. According to Ramos, Lorenset and Petri (2016, p. 2):

Educational games are characterized by several elements present in games, in general, and offer contributions to learning. Elements such as: objectives, rules, restrictions; interaction; challenge, competition, rewards and feedback (PRENSKY, 2007; WANGENHEIM; WANGENHEIM, 2012) contribute to learning and the development of players' cognitive skills.

In this context, in addition to influencing stimulation, educational games contribute in a general and positive way to cognitive development, favoring the child's learning; however, it is up to the mediator to analyze and direct the activity, aiming at its potential and thus attributing pedagogical value to the games. Rocha (2016, s/p.), in a publication on "Pedagogical games in learning" for the SUPERA Electronic Magazine, highlights that:

Pedagogical games also lead to the development of language, through contact with different objects and different situations. Playing also helps develop sociability, through winning and losing, sharing and respecting the rules.

For Gonçalves (2014, p. 4), the game "[...] facilitates learning, personal, social and cultural development, contributes to good mental health, prepares for an inner state

fertile, it facilitates the processes of socialization, communication, expression and construction of knowledge. “Andrade (2009, p. 12-14) exposes Piagetian and Vigostskian concepts:

Regarding play, Piaget (1998) believes that it is essential in a child's life. (p. 12)

For the Vygotskian current, the game is crucial for cognitive development, as the process of creating imaginary situations leads to the development of abstract thinking. (p. 14).

Luiz et al. (2014, p. 1) state that in the Wallonian conception “games are important, as the child confirms multiple experiences, such as: memorization, enumeration, socialization, sensory articulation, among others.”

In this way, the influences and benefits on the intellectual development of those involved through traditional and digital pedagogical games are evident. Therefore, it is considered that changes in intellectual performance through interventions and training with the association of traditional and digital pedagogical games on a therapeutic and/or preventive basis, stimulate and greatly contribute to the development of cognitive skills and abilities.

3 Methodology

The research approach regarding gender was a theoretical-empirical research, through studies with an exploratory focus and a qualitative investigative approach. The research technique was the case study, being developed by exploratory and descriptive studies. The action strategy for developing the research analysis was the phenomenological design, in which the object of study was observed in its natural environment. The data collection instruments for the bibliographical research were books, articles and Laws, and, for the field research, reports of complaints in developmental, educational and behavioral areas and semi-structured interviews.

4 Results and discussion

This research sought to prove that traditional and digital pedagogical games are valuable tools in cognitive stimulation; that are effective as stimuli for the

student intellectual development; and help structure teaching for children who have learning difficulties.

To this end, a thorough case study process was carried out, collecting evidence and analyzing the development of learning through direct and indirect observation (in the classroom, break time, physical education class, monitoring of class council meetings and discussions). individualized chat with students), documentary analysis (school material and assessments), interviews (with parents or guardians, and teachers) and stimulation with the association of traditional and digital pedagogical games over a period of 12 (twelve) months, with a frequency of 2 (two) times a week, for approximately 45 (forty-five) minutes.

Through the case study, it was possible to highlight the influences and benefits of traditional and digital pedagogical games on the intellectual development of those involved; Both individuals who presented a greater cognitive deficit and individuals who were more cognitively stabilized improved their performance with cognitive training.

In addition to improving cognitive development and increasing student learning, cognitive stimulation through the method of combining traditional and digital pedagogical games contributed to improving results at the School.

Therefore, it is concluded that digital and traditional games mobilize mental schemes, stimulate thinking, ordering time and space, integrate various dimensions of personality, affective, social, motor and cognitive, in addition to favoring the development of skills, such as coordination, obedience to rules, sense of responsibility, sense of justice, memorization, enumeration, socialization, sensory articulation, personal and group initiative and others.

Final considerations

The scope of the study object is considered regarding the use of traditional and digital pedagogical games in the cognitive development of students with learning difficulties, as well as the general objective of determining whether stimulation through games

Traditional and digital pedagogical methods make it possible to improve the cognitive development of students who have learning difficulties.

This research made it possible to prove that students who received stimuli through traditional and digital pedagogical games showed an improvement in cognitive development, increased learning, improved intellectual maturity, improved ability to reason, reflect and interpret.

Therefore, it is considered that traditional and digital pedagogical games are valuable tools in cognitive stimulation; they influence and contribute positively to cognitive development, favoring the student's learning and intellectual development and helping to structure teaching for children who have learning difficulties.

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