



Games and Mental Skills for Development Cognitive in Mathematics of Middle Basic Students



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Abstract

The research seeks to improve the thinking skills and abilities of high school students in the "Bachillero" Educational Unit through the implementation of mental games. These games promote reflection, thus improving the quality of life of students in difficult times. Various mental games have been developed that stimulate different reflections on the applied topics, achieving significant learning in different teaching areas. The methodology used in the research was based on a bibliographic search with an inductive approach. Relevant information was collected to demonstrate existing and probable situations. The objective is to allow students to develop critical-reflective thinking that allows them to face everyday challenges and problems differently. This research stands out for its innovative approach, raising the level of students' thinking and overcoming the limitations of the current educational environment. It seeks to address the deficiencies that prevent students from valuing the teacher's educational actions to improve their academic performance. It is essential to highlight that this proposal implies continuous and lasting training, establishing a close relationship between the teacher and the student.

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1 Introduction

The child's vital activity is play. To understand this, school learning must be well-oriented through motor games. These will be achieved through significant learning that will allow the development of cognitive, affective and social factors. From the point of view of Carmen Minera (2007), the game as entertainment softens the roughness and difficulties of life and thanks to it you can enjoy a true rest after a long and perhaps hard day of work. Hence, the game has been considered a recreational activity as a way to alleviate hard work where mental exercise has occupied a place of first magnitude.

The didactic game is a very valuable strategy at any level or type of education. However, unfortunately, many teachers do not use it enough due to their lack of knowledge about its many advantages. These games, which have an educational purpose, are structured as regulated activities that include moments of action and reflection, as well as the ability to symbolize and understand abstractly and logically what has been experienced, to achieve the established curricular objectives. Ultimately, the aim is for players to acquire knowledge, while promoting their creativity (Chacon, 2008).

It should not be forgotten that physical play is one of the main means of relationships and interaction with others. This stage is when the person's social behavior begins to be defined, as well as their interests and attitudes. The body, with its expressive and communicative nature, facilitates and enriches interpersonal relationships. In addition, it is important to know the skills that can be developed through play in each of the areas of student development, such as the socio-emotional, cognitive-verbal and academic aspects. It is also essential to understand the characteristics that a game must have to be educational, as well as its classification to know which one to use and which is most appropriate for a specific group of students (Akpur, 2020).

According to Miguel & M^a Ángeles (2016), The relationship between play and learning is natural; The verbs “play” and “learn” come together. Both words consist of overcoming obstacles, finding the way, training, deducing, inventing, guessing and winning... to have fun, to advance and improve.

Fun in classes should be a teaching objective. The recreational activity is attractive and motivating, it captures the students' attention to the subject, whether for any area they wish to work on. Games require communication and provoke and activate learning mechanisms. The class is imbued with a playful atmosphere and allows each student to develop their learning strategies. With the game, teachers stop being the center of the class, the “wise ones” in a word, to become mere facilitators-conductors of the teaching-learning process, in addition to promoting work in small groups or couples (Huang & Chiu, 2015; Kostianen et al., 2018).

Therefore, a didactic game should have a series of objectives that will allow the teacher to establish the goals that they want to achieve with the students, one among the objectives we can mention: is posing a problem that must be solved at a level of understanding that involves certain degrees of difficulty. Attractively reinforce the concepts, procedures and attitudes contemplated in the program. Offer a means to work as a team pleasantly and satisfactorily. Strengthen skills that the child will need later. Educate because it constitutes a means to familiarize players with the ideas and data of numerous subjects. Provide a stimulating environment for both intellectual and emotional creativity and finally, develop skills where the child has greater difficulty (Altintas et al., 2019; Francillette et al., 2021).

The role of the teacher is to consciously reconstruct our meanings of how to teach mathematics, regarding what should or should not be taught, and how it should be done so that the student learns consistently. By applying mental games we have developed that the minds of our learners process information faster, this allows us to stimulate memory and carry out new procedures that help the brain to work more actively. To achieve our purpose we have designed different mental games that allow the power of the mind to be developed in people of different ages, which is why we aim to prove that we all can develop cognitive skills that are linked in the mind to solve problems under a comprehensive model (Muñiz et al., 2014).

From a personal point of view, we have chosen this topic based on the observation of educational reality. We have noticed that most children consider mathematics boring, abstract, difficult and worthless, as they do not understand or are adequately explained how they can apply mathematical concepts in their daily lives. The role of the teacher is to consciously reconstruct our way of teaching mathematics, determining what should be taught and how to do it so that students learn coherently.

The main objective of the research is to demonstrate that mental games and skills contribute to the development of mathematical logical thinking in secondary basic education students in the "Bachillero" Fiscal Educational Unit. It also seeks to answer fundamental questions, such as: What type of mental skills games should be used to improve

cognitive development? How can mental skills games be integrated into mathematics teaching to promote cognitive development?

Based on the above, it is considered that research on games and mental skills and their impact on the cognitive development of middle school students highlights the importance of teachers sharing their knowledge with students in a productive and less stressful way. It is also argued that the teacher must plan and implement mental games that allow students to construct their knowledge through their relationship with the environment (Hardy et al., 2010; Hull et al., 2012).

2 Materials and Methods

The research employs both a qualitative and quantitative approach. The quantitative approach focuses on the collection and analysis of numerical and statistical data to quantitatively measure the impact of mental games and skills on students' cognitive development in mathematics. On the other hand, the qualitative approach is based on understanding and describing phenomena in their natural context through direct observations and interviews.

In terms of methods used, the inductive method was used to identify the research problems and the causes of the low development of elementary operations at the higher basic level. The deductive method was used to deduce the causes and effects of the problem investigated and determine the dependent variable. The analytical method was used to justify the research and analyze relevant theories about the teaching-learning process and the low development of elementary operations. The synthetic method was used to present the proposal and find a solution to the problem investigated.

Regarding the techniques, the interview with the Leader of the "Bachillero" Educational Unit was used to obtain specific information about the mental games used in middle school and their impact on learning. In addition, a mental observation sheet was applied to high school students to directly approach the problem and observe the students' reality. It should be noted that the statistical method was also used for data collection, analysis and interpretation, to tabulate the research data.

The universal population is the high school students, the Leader and the teachers of the Bachillero Educational Unit in a total of 33 participants and no sample was taken since the size of the population is finite because it is delimited.

3 Results and Discussions

Games and mental skills

Games have educational value due to the opportunities they provide to explore the environment and establish logical relationships through interactions with objects, the environment, other people and oneself. The first notions of topology, time, space and problem-solving are developed from activities carried out together with others in different movement situations.

By activating these cognitive and motor mechanisms through situations that explore bodily capabilities and solve motor problems, we seek to promote the acquisition of the greatest possible number of basic motor patterns. This allows us to build new movement options and properly develop motor capabilities and fundamental skills (Batlori, 2000).

The purpose of generating these concerns revolves around the importance of using this strategy within the classroom and that in some simple way, it can be created without the need to handle the topic in depth, in addition to the fact that from some practical solutions, it can perform this task pleasantly and comfortably for both the teacher and the students. All of this is to generate effective learning through fun.

Play constitutes the child's main occupation, as well as a very important role because through it you can stimulate yourself and acquire greater development in your different areas such as psychomotor, cognitive and affective-social. Furthermore, play in children has educational purposes and also contributes to increasing their creative abilities, which is why it is considered an effective means for understanding reality.

Didactic strategies as external mediators are modelled in the course of interactions between those who learn and those who teach. To achieve good results in problem-solving, classes dedicated to problems should be offered, based on the heuristic method, since its lack of use in this activity has its impact on the school, and many teachers declare:

My students have the related mathematical knowledge. with the problem to be solved, but they are not able to solve it (Abdi, 2012; Anggraeni et al., 2023).

When talking about the heuristic method, refers to the presentation of the problem and then, if the student requires it, the teacher will ask questions, suggestions and instructions to the students to facilitate the search for the solution to the problem; The teacher will also the option, if necessary, of allowing the students to acquire knowledge through the reasoning that he will direct.

To contribute to the success of the entire activity, it is important to prepare students and equip them with a set of methods, strategies and work techniques that allow them to gain independence and confidence in solving problems. Components of learning thinking.

The elements that intervene in learning thinking, as known until today, can be classified as seen in Figure 1 according to Cortese (2019):

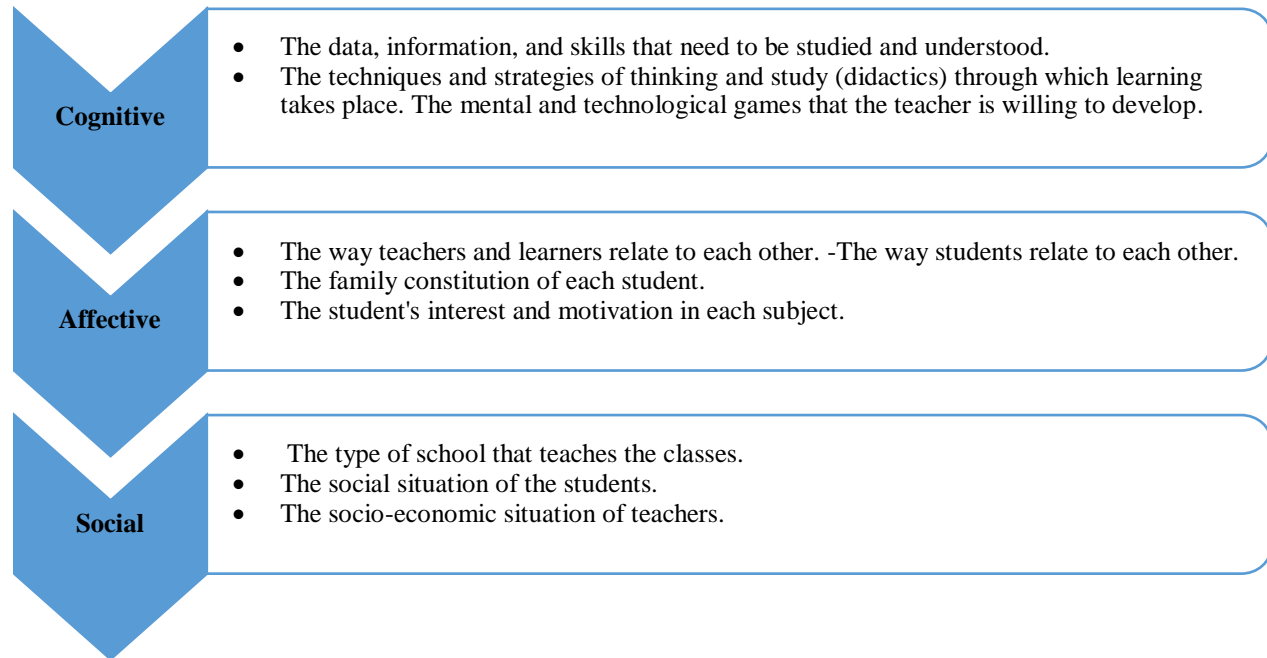


Figure 1. Elements involved in learning thinking

Taking these factors into account, we can specify the learning process and talk about integrality and partiality in education and also distinguish the way of instruction of the teachers of each institution

Reasoning guidelines through mental games

Current views on the patterns of cognitive performance of subjects in general place considerable emphasis on the notion of heuristic versus formal and rigorous rule. While a formal rule works on all occasions, a heuristic works only in certain cases. Various authors have reviewed the results of research on the spontaneous ways of reasoning of high school and university students, where the following conclusions stand out:

Students often focus on explaining changes that occur in systems rather than stationary states. When a change or transformation occurs, attention is primarily directed to the final state rather than the initial state. Typically, a system is investigated only when it undergoes some change that deviates from its normal functioning. This approach is based on the principle of "if something ain't broke, don't fix it." Furthermore, problems tend to be addressed according to the knowledge that is best mastered, not necessarily the most relevant to their solution (Salinas et al., 1996).

An equilibrium state often tends to be considered static, and it is difficult to conceive of dynamic equilibria. Students usually base their reasoning on linear causality, where a direct relationship is established between causes and effects. However, it is important to keep in mind that between causes and effects, there may be mediators or intermediate factors that influence the final result (Thiberghien et al., 1995).

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Significant learning

Meaningful learning includes the acquisition of new meanings and, conversely, these are the product of meaningful learning. The emergence of new meanings in the student reflects the consummation of a significant learning process. After indicating in some detail what this process encompasses, we will examine more explicitly both the nature of meaning and its relationship to meaningful learning (Ginaya et al., 2020).

It is also true that the component and significant elements of a learning task can be related to the cognitive structure without the elements themselves being learned, but in a way that together facilitates learning by repetition of the task. It is because of this rationality that, for example, the letters that make up meaningless syllables are perceived significantly, and the syllables together evoke associations with similar meaningful words (and thus are perceived as partially meaningful).

For the same reasons, increasing familiarity with the material, overcoming the need to learn the component elements in advance and facilitating the combination of these into larger units (and thereby reducing the total number of discrete associations that must be established), the use of the elements already significant components of the learning material facilitates learning by repetition (Novak, 2017).

To identify whether mental games improve cognitive development in students, a survey was applied to 10 teachers, through a questionnaire with closed-type questions, the results shown in Table 1 were obtained, relating to how Mental games help the cognitive process of the subject.

Table 1
The use of mental games improves the cognitive process in mathematics

Alternatives	Frequency	Percentages (%)
Yes	7	70,
Maybe	3	30

Source: Teachers of the “Bachillero” Educational Unit

Table 2 shows the result of the query related to the motivation of mind games.

Table 2
Mental games motivate student to improve their performance

Alternatives	Frequency	Percentages (%)
Yes	7	70
No	1	10
Maybe	2	20

Source: Teachers of the “Bachillero” Educational Unit

Table 3 shows how the little use of mental games will harm students' learning.

Table 3
Little use for mental games

Alternatives	Frequency	Percentages (%)
In cognitive development	3	30
To the teacher's knowledge	2	20
Meaningful learning	5	50

Source: Teachers of the “Bachillero” Educational Unit

Table 4 shows the query related to the influence of mental games on the cognitive process.

Table 4

The application of mental games significantly influences the cognitive process of students

Alternatives	Frequency	Percentages (%)
Affects cognitive development	5	50
Does not affect cognitive development	2	20
Meaningful learning	3	30

Source: Teachers of the “Bachillero” Educational Unit

Figure 2 shows the teachers' criteria related to the fact that mental games allow for improving the cognitive development of students.

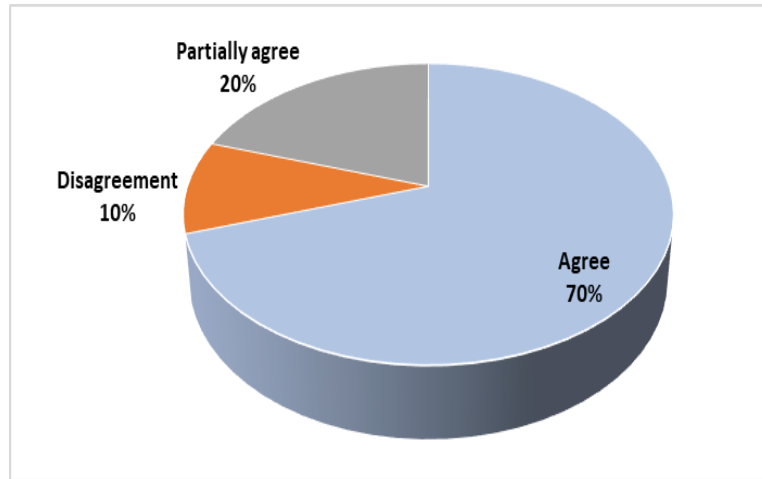


Figure 2. Mental games improve the cognitive development of students

Source: Teachers of the “Bachillero” Educational Unit

As can be seen, 70% of the teachers agreed that mental games improve the cognitive development of students.

Figure 3 shows the teachers' criteria related to the resources that the institution has to apply the techniques and methods to implement mental games for the cognitive development of learners

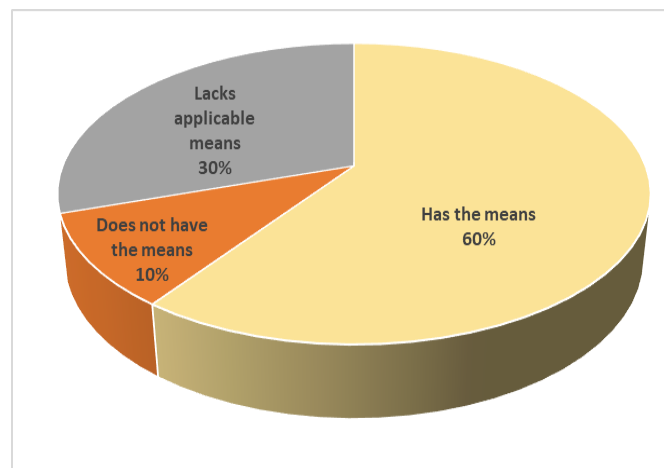


Figure 3. Resources that the institution has to apply the techniques and methods to implement mental games

Source: Teachers of the “Bachillero” Educational Unit

As noted, 60% of the teachers surveyed agree that the institution has the resources to implement mental games for the cognitive development of children

As can be seen from the first table, 70% of the teachers of the “Bachillero” Educational Unit have as their criterion that the use of mental games does improve the cognitive process in mathematics, while 30% believe that perhaps it improves the cognitive process. of mathematics, which shows that this type of procedure is favorable for the student's educational process. As stated by [Agualimpia \(2012\)](#) in his degree work, states that, when trying to relate play with cognitive development, it is necessary to reflect on what aspects of cognitive development can be affected through educational action. Various authors, such as Moyles, Bruner, Vygotsky, and Torres among others, affirm that play can measurably affect cognitive processes such as: Intelligence, learning, perception, attention and memory. Which at the same time constitute basic approaches for the development of this particular curricular project.

Analyzing whether mental games motivate students to improve their academic performance, 70% of the population of the aforementioned educational unit emphasize that mental games favor and encourage the teaching-learning process of students. As stated by the following actors in their degree work ([Ramos Pérez & Regino González, 2022](#)). Play is an activity that is part of a child's life long before school, becoming a daily event and an aid to develop their skills, so it can also be a useful strategy to facilitate learning, as proposed by the psycho-pedagogue Francesco Tonucci, who in an interview comments the following: Children learn much more by playing than by studying; doing, than looking. The play they do alone without the control of adults is the highest cultural form that a child plays. Children who have been able to play well and for a long time will be better adults. (Acor Foundation, 2018). Of 10 teachers surveyed, 30% of them think that mental games harm cognitive development. While 5 teachers, that is, 50% of them, claim that they harm meaningful learning, and only 20% say that they harm the teacher's knowledge.

In the section on whether the application of mental games influences learning. The highest percentage of teachers surveyed have the opinion that the application of mental games positively influences the cognitive development of the learner 50%, 20% respond that it does not affect cognitive development and the remaining 30% respond in learning. significant. Therefore, the application of mental games does positively influence the student's cognitive development according to 100% of surveyed and tabulated data.

According to the criterion, if the institution has all the techniques and methods to apply mental games, 60% of those surveyed in the institution have all the techniques and methods necessary to apply mental games, while 10% indicate that they do not have all the resources and 30% affirm that they lack means. This indicates that the institution has significant room to improve the cognitive development of students. According to Ángel Martín, there is no drug to prevent cognitive deterioration, unless there is an identified cause, such as vitamin B12 deficiency, hypothyroidism, stroke, head trauma or brain hemorrhages, among others. However, it does recommend cognitive stimulation to strengthen brain functions, such as memory exercises, reading or any activity that makes us maintain concentration and attention for a long time (La vanguard, 2016).

4 Conclusion

It is concluded that mental games, when used appropriately, considerably improve the mental skills related to mathematics in students, it was observed that using mental games stimulates the cognitive development of students and promotes interest and understanding of mathematics in a fun and motivating way. It was analyzed that teachers need to incorporate mental games in the teaching of mathematics, which implies receiving adequate training, having the necessary tools and materials, and ensuring systematic integration in the study plans.

Conflict of interest statement

The authors declared that they have no competing interests.

Statement of authorship

The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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