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## Digital Teaching Resources to Enhance Logical Thinking

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**Abstract**---The digital teaching resources to enhance logical thinking are technological tools designed for learning, such as applications, platforms, games, and simulators. These resources focus on developing reasoning, analysis, problem-solving, and critical thinking skills interactively and practically. The objective was to analyze the effectiveness of digital teaching resources in improving logical thinking in seventh-year students of Basic General Education in the "Cinco de Mayo" Educational Unit. Analytical-synthetic, inductive-deductive, and explanatory methods were used, complemented by statistical data. The results indicate that using digital resources increases motivation and understanding, facilitating the resolution of logical problems autonomously. Likewise, it is observed that these tools allow learning to be adapted to the pace of each student, promoting a participatory and meaningful approach. In conclusion, the implementation of digital resources in mathematics teaching promotes more effective and adaptable learning, standing out as a key strategy to enhance logical-mathematical competencies in diverse educational contexts.

**Keywords**---autonomous learning, basic education, digital resources, logical thinking, teaching strategies.

### Introduction

Currently, Digital Educational Resources (RED) have become fundamental tools for the teaching-learning process. These provide teachers and students with a more creative, innovative, and participatory approach, in addition to contributing to the strengthening of mathematical skills and promoting more effective problem-solving. Promoting logical-mathematical thinking is key for students to develop skills and successfully face the challenges of daily life. Mathematics, as one of the most relevant subjects in the basic curriculum, must occupy a central place in the learning process, allowing students to acquire knowledge efficiently and enhance their abilities to function in various contexts.

In relation to the project presented, students at the level of basic secondary education must and must be understood as a creative process through which teachers, who fulfill the mission of teaching and students who fulfill the task of learning, interact with the purpose of acquiring knowledge, which is why their execution allows the creation of new concepts, strategies and digital teaching resources for teaching-learning.

Based on the above, this research was considered necessary, the objective of which is to analyze the digital teaching resources that can enhance the development of logical thinking in seventh-year students of secondary basic education of the Fiscomisional Educational Unit "Cinco de Mayo", located in the Chone canton, during the first quarter of the 2024-2025 school year. This research will provide key information for making relevant decisions and

actions (Iivari et al., 2020; Assaad & Krafft, 2015). In this context, the following problem was posed: How can digital teaching resources improve logical thinking skills in seventh-year EGB students of the Fiscomisional Educational Unit "Cinco de Mayo"?

## Materials and Methods

A mixed method approach was used, integrating quantitative and qualitative data to evaluate the impact of digital teaching resources on the development of logical thinking of seventh-year students of Basic General Education (EGB) at the Fiscomisional Educational Unit "Cinco de Mayo". during the first quarter of the 2024-2025 school year. The research included two groups of students, Seventh A and Seventh B, who participated in activities designed to evaluate the use and effectiveness of digital teaching resources. The specific characteristics of each group are described in the results tables. The techniques used were the interview that is directed at the teacher, the survey that is directed at the students and an observation sheet that was carried out in a class for what corresponds to a traditional class and a class using digital resources (Çığrık & Ergül, 2010; Bayram & Comek, 2009).

A structured instrument was used that assessed key indicators such as student motivation, understanding and participation, with and without digital resources. Methods adapted to digital resources aligned with logical-mathematical learning objectives were included. Digital resources were used as interactive software to solve logical problems, favoring group work and real-time evaluation and compared with those that did not use digital resources: Problem solving using traditional methods, without the support of technological tools.

## Analysis and Discussion of the Results

Logical thinking is the ability of the human being to understand everything that surrounds us and the relationships or differences that exist between actions, objects, or observable facts through analysis, comparison, abstraction and imagination (Rojas et al., 2021) also states (Travieso Valdés & Hernández Díaz, 2017) that in human beings only concrete thoughts develop during childhood.

During the growth of the human being, we can generate logical thinking and constantly apply it to solve the different situations that arise in daily life. Logical thinking is constantly applied in various scientific studies since it allows us to analyze, compare, determine, and differentiate objects, hypotheses, procedures through various solutions that arise from previous experiences (Holguín & Mendoza Moreira, 2022).

Logical thinking is a tool through which we can reason, argue, and explain the different situations or objects that are around us. It is also associated with ICT. They also play a fundamental role in the transformation of the current learning environment, centered on the teacher, to one centered on the student, where the teacher stops being the main source of information and the main transmitter of knowledge to become a facilitator of learning, and where the student is no longer a passive recipient of information but actively participates in its own learning, for which it is an educational field that The goal has always been to achieve student learning (González Martínez, 2021).

Learning and teaching have different conceptions depending on the educational approach that attempts to sustain learning, which is understood as a process of constructing knowledge of reality that develops in the mind of each person; This construction process can be favored with didactic interventions, which must always be presided over by well-defined pedagogical positions (Tulbure, 2012; Caro et al., 2016).

The teaching materials and resources are elements that facilitate the construction of learning in this sense, each learning requires specific conditions that are different from another. Conditions are to be determined through planning and evaluation processes. These learning conditions are determined by two elements: educational resources and teaching strategies, and by the interaction of both (Ricce Salazar & Ricce Salazar, 2021).

Digital teaching resources have been the result of the collaboration of many professionals in the field of education, technology, and instructional design (Guerrero & Bernal, 2021).

According to Enríquez (2022), it states that there is no single creator of these resources since they have evolved thanks to the contribution of various experts and work teams around the world. However, we can identify pioneers in the field, such as Seymour Papert, who worked on developing tools such as Logo, a programming language designed for teaching, or Douglas Engelbart, who developed the computer mouse and explored its potential for education. In addition, educational companies and organizations have also been crucial in the creation and promotion of digital teaching resources.

From the position Terán et al. (2022), he mentions that logical thinking does not have a single creator, since philosophers, mathematicians, scientists and thinkers from various disciplines have developed and refined it in

history. However, one of the main contributors to the study and formalization of logical thinking was Aristotle, an ancient Greek philosopher.

Aristotle defined logic as the study of the principles and methods used to distinguish correct reasoning from incorrect. He proposed rules and structures for valid reasoning, such as the syllogism, a deductive argument consisting of two premises and a conclusion. This approach is known as Aristotelian logic and laid the foundation for the systematic study of reasoning in Western philosophy (Mantra et al., 2019).

Since then, logical thinking has been the subject of study in various disciplines, including philosophy, mathematics, computer science, and psychology. It refers to the ability to analyze, evaluate and make inferences in a coherent and structured manner, following logical rules and principles.

From the point of view of Domínguez et al. (2022), mentions that an educational resource is any material, tool or means that is used to facilitate the teaching and learning process. Taking into account Esteban (2021), these resources can be both physical and digital and can include textbooks, whiteboards, educational software, videos, games, simulations, among others.

On the other hand, Morocho & Paida (2021), states that a teaching resource is a specific type of educational resource designed to promote understanding and learning of a particular topic. Using the words of Cori et al. (2022), he mentions that teaching resources are designed according to the learning objectives and needs of students, and are used to present, practice or reinforce concepts and skills.

The main difference between the two lies in the approach and intention of use. While educational resources encompass any material used in an educational context, teaching resources are specifically designed to teach or facilitate understanding of a particular topic. Teaching resources are usually more interactive and designed to promote student participation in the learning process. Digital resources are any educational, informative or entertainment material or content presented in digital format, in the form of binary data that can be processed by computers, tablets, smartphones, among others.

These resources can include a wide range of formats, such as text, images, audio, video, animations, interactive simulations, educational games, mobile applications, online platforms, among others. Their main characteristic is that they are accessible and manipulable with electronic devices and can be distributed and shared over the Internet or other digital networks.

Digital resources have revolutionized the way we access information and how we learn, as they offer the possibility of personalization, interactivity, and adaptability to the individual needs of users. Additionally, they allow greater flexibility in terms of time and place of access, making them powerful tools for education, communication, and entertainment in the digital age. There are several authors of Logical thought shown in figure 1.

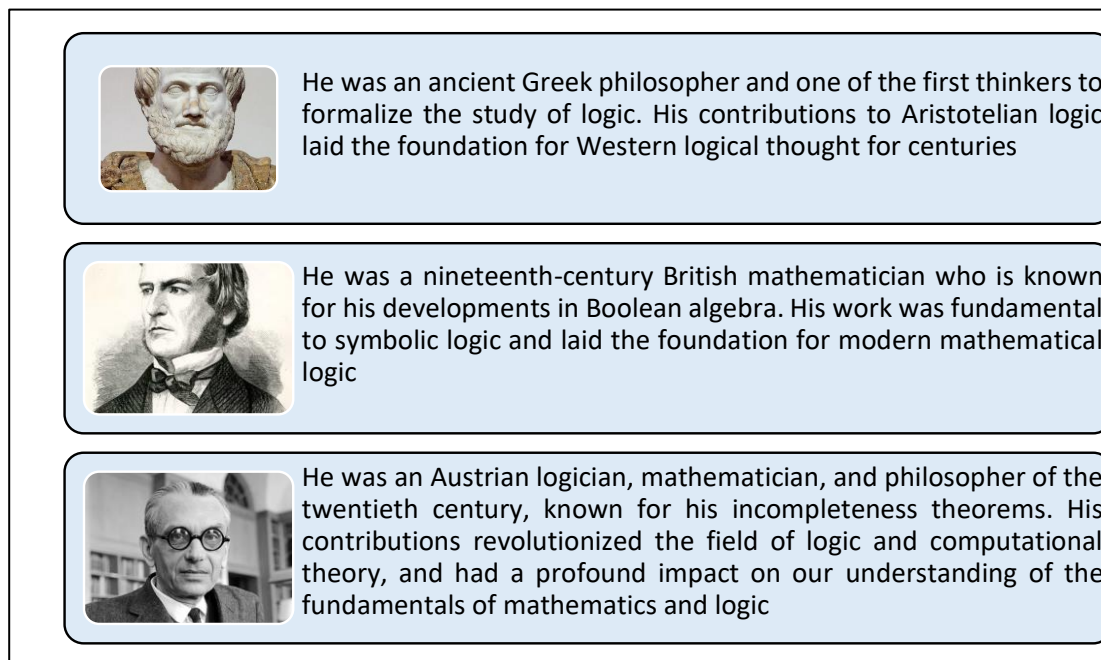


Figure 1. Authors of logical thought

In the educational framework of the Fiscomisional Educational Unit “Cinco de Mayo” in the Chone Canton, a somewhat crucial challenge was presented when students do not use their logical thinking as a study tool since through that resource they can develop the subconscious. developed completely and this gives a performance deficit when performing any mathematical operation or other activity, this reason shows a solution to the performance deficit that students have when using a digital tool as a teaching resource so that students have a more active development to the thought logical. Table 1 shows the comparative observation sheet.

Table 1  
Comparison of the observation sheet

Pasked questions	With Digital Resources	Without Digital Resources
Do students use resources to solve logical problems during class?	Yeah	No, the use of calculators or other resources is not allowed.
Do students show a greater understanding of logical concepts?	Yes, digital resources increase your interest and understanding	Yes, although there are distractions or confusion in some students.
Do they actively participate in the activities proposed by the teacher?	Yes, especially if the software appeals to them	Yes, they participate, but they prefer not to be graded instantly.
Are they motivated and engaged when interacting in the classroom?	Yes, with a preference for group activities	Yes, although some seem a little upset or distracted.
Do the resources allow us to delve deeper into the logical topics covered?	Yes, digital resources make it easier to delve deeper	Yes, although some students get distracted or lost in the topic.
Do they understand logical problems better?	Yes, the use of technology increases interest and facilitates understanding	Yes, but with distractions and confusion in certain students.
Do the resources used seem adequate for the development of logical thinking?	And	And
Do they solve logical problems more autonomously?	Yes, although they prefer group work to avoid the pressure of instant grades	Yes, they show autonomy when they manage to focus.
Do they show confidence when solving logical problems?	Sometimes they feel pressure to immediately qualify the software	Yes, although some are insecure.
Does the use of resources promote comparative work for the development of logical thinking?	And	And

Figure 2 shows the results of the consultation with students about the digital resources used by teachers to promote logical thinking in seventh grade A and B.

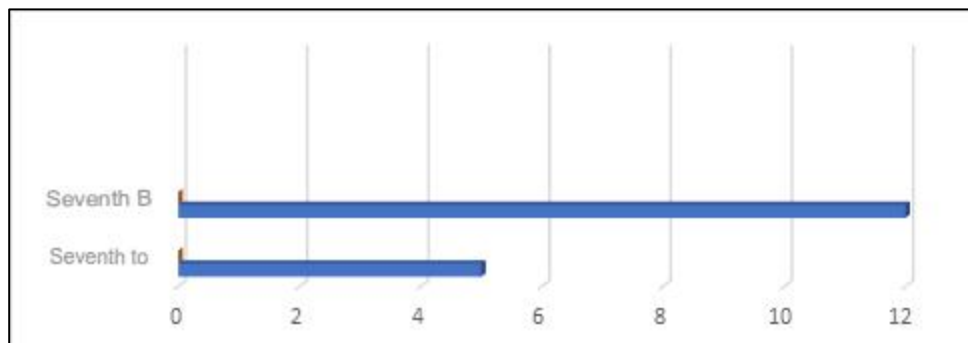


Figure 2. Teachers use appropriate resources to promote logical thinking

In the Seventh A group, 7 students "Strongly agreed" that digital resources are suitable for promoting logical thinking, and the Seventh B 12 students. In Seventh A, 7 students (35%) consider that digital resources adequately promote logical thinking, while none perceive them as inadequate, which reflects positive or neutral opinions. On the other hand, in Séptimo B, 12 students (60%) agreed with the effectiveness of these resources, and no negative reviews were recorded either. In general, group B shows a more favorable perception than group A, which could be due to differences in implementation, resource management, or the characteristics of the groups. Figure 3 shows the response to the question about whether the digital resources provided by the teacher are easy to use.

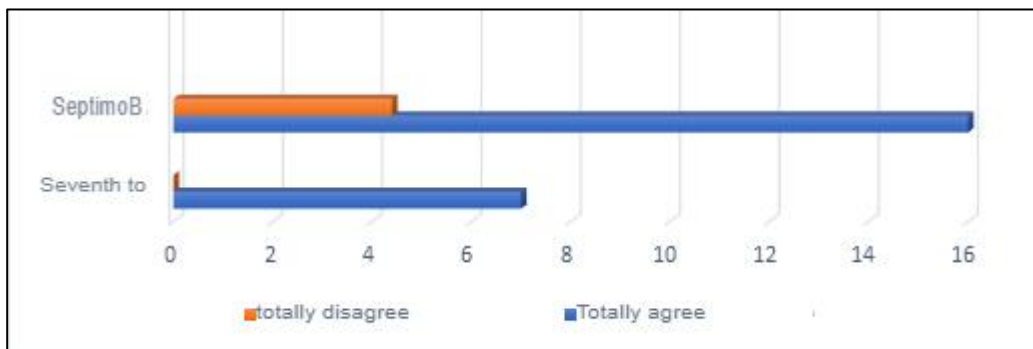


Figure 3. Digital resources provided by the teacher are easy to use

In Seventh A, only 7 students (35%) consider the resources easy to use, while a significant majority (80%) face difficulties, which shows important accessibility or training problems; In contrast, in Seventh B, 16 students (80%) find the resources easy to use, showing a very positive perception, and only 1 student reports difficulties. These differences highlight potential gaps in the support provided or pre-existing technology skills between the two groups. Figure 4 shows the question about whether I would recommend the use of these digital resources to other students to improve their logical thinking.

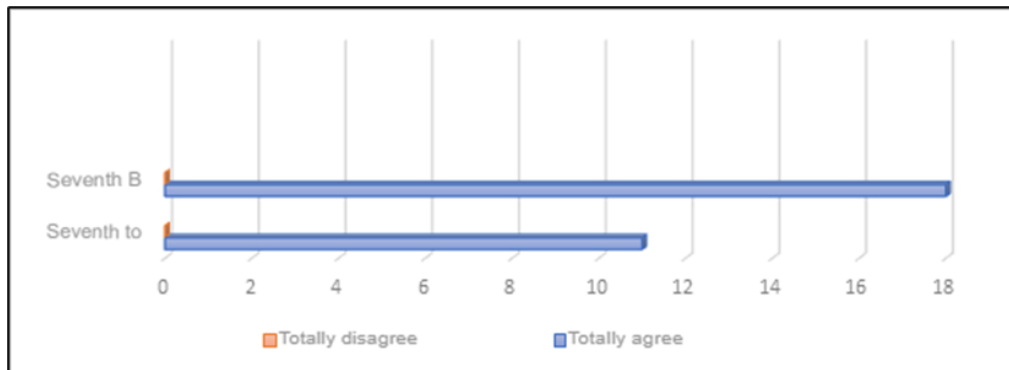


Figure 4. I would recommend the use of these digital resources to other students to improve their logical thinking

In Seventh A, 11 students (55%) would recommend the resources to promote logical thinking, without any rejection being recorded, reflecting a generally positive assessment; while, in Séptimo B, 18 students (90%) show an even more solid acceptance, consolidating confidence in the usefulness and effectiveness of these resources by not presenting negative criticism.

#### General Observation and Analysis with digital resources

In the analysis of the use of digital resources, it was observed that students in groups 7th A and 7th B present differences in motivation and participation. While both parallels value these resources to solve logical problems and improve understanding, 7th B shows an additional interest motivated by the attraction towards technology, which favors their understanding and active participation. In contrast, in 7th A some students are demotivated due to the software's grading system, preferring group activities to feel more confident.

Regarding interaction without digital resources, both groups experience certain difficulties. Comprehension and attention decrease without the use of technological tools, with greater distraction in 7th A. Although traditional

resources are considered adequate to develop logical thinking, the lack of attractiveness decreases engagement, especially in 7th A, where signs are observed of demotivation. Despite this, both groups achieve autonomous participation in logical activities, although limited by the lack of additional resources (Martín-Gutiérrez et al., 2015; Nguyen, 2012).

The use of digital resources appears to be most beneficial for student engagement and understanding, especially in 7th B, where interest in technology drives participation. However, the grading system can affect student motivation, making it crucial to consider improvements in this aspect to optimize the benefits of digital learning in both parallels. The numerical data provided reflects clear trends in terms of ease of use of digital resources: 80% of students in seventh B compared to 35% in seventh A reported ease of use, in relation to the effectiveness of the resources for logical thinking. : 60% of students in seventh B "totally agree" compared to 35% in seventh A.

Regarding the recommendation of resources, the highest proportion of students in seventh B (90%) would recommend the resources compared to seventh A (55%). These data provide an objective view of students' perceptions and experiences, highlighting significant differences between the two groups. The qualitative observations complement and deepen the analysis on motivation and commitment where students showed a greater willingness to participate when the activities were group and did not imply immediate grades; This suggests that social dynamics and evaluative pressure influence learning.

Distractions and confusion were also assessed, where it was assessed that some students faced difficulties concentrating, which could be related to familiarity with the technology or the characteristics of the resources used. Lastly, contextual differences were assessed, where the best Acceptance of resources in Séptimo B may be due to qualitative factors such as more efficient implementation or more receptive group dynamics. An integration and mixed analysis was carried out that allowed the quantitative and qualitative results to be crossed for a more holistic interpretation:

The discrepancy was noted when observing the numbers where differences are indicated in the perception of the effectiveness and ease of use of digital resources; however, qualitative observations suggest that these discrepancies could be associated with the implementation context, technological familiarity, or pedagogical strategies employed.

In the case of the potential of digital resources, the figures show a high recommendation of the resources, the qualitative observations highlight that their impact depends on factors such as the design of activities and the support provided to students. One of the analyses carried out is related to the implications of the teacher's practices, noting that the quantitative data supports the effectiveness of the resources, but the qualitative observations emphasize the need to adjust the strategies according to the characteristics of each group

## Conclusions

The implementation of digital resources, such as educational platforms and interactive games, enhances logical thinking in basic education students, improving their motivation, understanding, and autonomous learning. A study at the "Cinco de Mayo" Educational Unit showed that these tools increase interest in solving logical problems, although it is necessary to balance digital learning with strategies that reduce the pressure of immediate evaluations. Well applied, these resources transform learning and strengthen critical and structured skills in students.

The comparative analysis between seventh A and seventh B shows that context and implementation influence the impact of digital resources. seventh B had greater acceptance thanks to its familiarity with technology and better teaching management, while seventh A faced more access and adaptation difficulties. Group dynamics and the design of activities affect motivation and understanding, highlighting the need for technical support and prior training for students and teachers, which would guarantee greater equity and better use of digital resources

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