

## How to Cite

Vera-Zambrano, J. E., & Reyes-Meza, O. B. (2022). Development of skills in the mathematical logic field. *International Journal of Physics & Mathematics*, 5(1), 28-33. <https://doi.org/10.21744/ijpm.v5n1.1914>

# Development of Skills in the Mathematical Logic Field

## Jessenia Elizabeth Vera-Zambrano

Maestría Educación Básica, Universidad Laica Eloy Alfaro de Manabí, extensión Chone, Manabí, Ecuador  
Corresponding author email: [jessenia.vera@pg.ulead.edu.ec](mailto:jessenia.vera@pg.ulead.edu.ec)

## Orley Benedicto Reyes-Meza

Universidad Laica Eloy Alfaro de Manabí, extensión Chone, Manabí, Ecuador  
Email: [orley.reyes@uleam.edu.ec](mailto:orley.reyes@uleam.edu.ec)

**Abstract---***The study aimed to determine the development of mathematical logic skills and abilities of the Initial sublevel of the Jacinto Educational Unit Santos Verduga 2021-2022, which raised as a problem the causes that prevent the development of mathematical logic skills, due to the lack of stimulation of parents towards their children at an early age, due to ignorance and disorientation of the teacher towards parents of how to help them. Logical-mathematical knowledge is what the child builds by relating the experiences obtained in the manipulation of objects. The methodology used was based on a descriptive-explanatory level of research with a quantitative approach due to the relationship of the variable with the object of study, using the inductive-deductive, analytical, synthetic, and statistical methods. applying various data collection instruments such as: the survey to teachers, questionnaires to parents, and observations of students. It was obtained as a result that the boys and girls of the educational unit have little development in mathematical logic skills, which can trigger difficulties in the appropriation of mathematical concepts.*

**Keywords---***abilities, field, mathematical logic, skills*

## Introduction

The study of the development of mathematical logical skills and abilities of the Initial sublevel of the Jacinto Santos Verduga Educational Unit 2021-2022, was raised by the need to establish guidelines to improve mathematical reading to causes of problems that children have when reading and ordering small amounts, substantial for the following sublevels. The theoretical information is supported by authors such as (Abreu, 2012), who define skill as the capacity of the teaching and learning process, which is formed, developed and perfected as knowing how to think, or knowing how to do, or knowing how to act that characterizes students the mastery of action, Piaget.

In Ecuador, in a study carried out in an educational institution in the city of Riobamba (Guanga Chunata, 2012), it shows that mathematical logic constitutes an indispensable basis for learning new knowledge that ensures the interaction of students with the teacher and their environment. surrounds them, hence the importance of the development of mathematical logic intelligence in the human being and especially in elementary basic education students. According to Mareschal (2016), he states that currently the research carried out in the field of mathematics indicates that boys and girls, long before entering any educational institution, have built certain notions of mathematics in interaction with their environment and with adults

The problem in the Educational Unit, the object of the investigation, is that the didactic process is not fulfilled in such a way that the objectives are achieved in this sublevel in accordance with what is determined by the Ministry of Education (2017). To achieve propose creative solutions to specific situations of the national and world reality through the application of the basic operations of the different numerical sets, and the use of functional models, appropriate algorithms, strategies and formal and non-formal methods of mathematical reasoning, which lead to judging with responsibility the validity of procedures and results in a context. " (Education-Ecuador, 2017).

Didactics for the development of skills and abilities is achieved as children explore their environments, manipulate objects, their sizes and shapes, understand the concept of numbers, conservation, one-to-one

correspondence, order situations to have a mathematical thought, that is capable of handling numerical sequences, so the teacher must work on the development of basic reasoning skills that allow them to solve simple addition, subtraction, multiplication and reduction problems of various measures.

The existing problem is a situation that must be addressed urgently by those who educate at this level, in that mathematics is considered essential in children's learning since it will help them develop their reasoning and problem-solving skills. then if we intervene objectively to the reality of what is happening at the initial sub-level, then the children will learn in a pleasant and simple way with the appropriate material for this age, then it is necessary the accompaniment at home by the parents, these must constitute the ideal support in the development of their activities because children require accompaniment for their cognitive development (Passolunghi et al., 2007; Brown & Burton, 1978; Merkley & Ansari, 2016).

Another of cause that prevents the development of skills is because parents do not know how to stimulate their children at an early age, by not knowing or not knowing how to do it, they are limiting their creativity in the exercise of their activities, and therefore the children lose a certain nature in their growth and development; In addition, the study modality does not guarantee a comprehensive education, children, due to their characteristics, are very active, and by sitting listening to the teachers' dispositions, we are creating sedentary children that do not favor their way of thinking and acting, and therefore both are reduced in higher grades calculation exercises, numerical thinking, mathematical logic problem solving, to understand abstract concepts, reasoning and understanding of relationships, among other aspects.

The formation of the problem How does the development of skills affect the mathematical logic field of the initial sublevel of the Jacintos Santos Verduga educational unit? It has been possible to observe the presence of permissive family environments, overprotective, alienated in their concerns, each having an impact, effect, and consequences on the development of the autonomy of boys and girls. Unfortunately, by not intervening in a timely manner in their management, they become not only an individual problem but also a social one.

Skill development and prior knowledge go so far as to state: "If I were to reduce all of educational psychology to a single principle, I would say this: the single most important factor influencing learning is what the learner already knows, look for and teach him accordingly" (Ausubel, 1978 cited in Novak, 1988). (Batista et al., 2001. Maracaibo, Venezuela). As Gil Madrona et al. (2008), points out, basic motor skills (MBS) are all those natural movements generated by the body that manifest from birth and continue throughout the life of each child, as well the same are those that help cognitive, socio-affective, and physical development, which are: running, jumping, throwing, catching, pushing, pulling and their combinations. Santrock (2000), highlights that, through the accompaniment in the teaching and learning process, people can acquire a series of thinking skills that are essential for learning and the favorable assimilation of each experience, which may later suffer changes. (Gil, 2016). Paltan Zumba Geovanna. Muñiz & Fonseca-Pedrero (2019). The University of Cuenca concludes that the various conceptions on the development of mathematical logical thinking point to contact and direct manipulation of concrete material, to achieve significant learning in students, it is also necessary to start from the context of the students and the problems of life. daily to work mathematics and aim at the development of mathematical logical thinking, points out that it is essential that children develop the ability to explain the processes used in solving a problem, to demonstrate their mathematical logical thinking, and to interpret phenomena and situations every day, that is, true learning to learn. But something important to develop mathematical skills and abilities, not only has to do with imparting in the teaching of numbers, but the teacher must start by stimulating the sensory areas of children, For Castejón & Navas (2013), early stimulation aims to prevent possible problems that may arise in babies who in principle do not present abnormalities of any kind but who, especially due to the environment in which they are going to develop, may suffer some type of dysfunction. (Barreno-Salinas & Macías-Alvarado, 2015).

The ability of children to assimilate information easily in childhood is what is known as brain malleability or plasticity Medina-Sánchez et al. (2017), which disappears for life after six years, and Significant brain development is almost over. For his part, Téllez, R., in his book Introduction to early stimulation, states that in psychomotor stimulation the child acquires normal muscle tone, correct posture, position and movements, good body balance, behavior stability and attention, control elements to be silent, listen, learn, and collaborate. but the promotion of the activity comes from the teacher, who starts with his methodology and his teaching philosophy. In this sense, let's see what some researchers express:

To obtain an overview of teaching methodologies, we begin with the model of Hernández et al. (2018), this author points out two crossed dimensions to situate teaching methodologies. One dimension is the degree of objectivity of knowledge, academic and formalized knowledge being situated in the objective pole, while personal experiences or conceptions are situated in the subjective pole; the other dimension is the activity of the teacher or student.

Some classic research in educational psychology indicates that the figure of the teacher and their way of teaching are key elements in this process (Bruner, 1962; DeCharms, 1976; Deci et al., 1981). In this regard, teachers who encourage feelings of competence and autonomy in their students and who encourage the acquisition of new skills in a pleasant and satisfactory context favor the intrinsic motivation of schoolchildren in the task (Ryan & Deci, 2000; Hernández et al. 2018). Students maintain the idea that mathematics does not have a fundamental meaning in the development of logical reasoning and creative thinking.

This definition of mathematics as science par excellence is what favors the intellectual formation of the individual (Blanco et al., 2013). Hence, the activities of the teacher are fundamental to work by curricular blocks and the development of skills with performance criteria, leaving aside traditional practices with mathematical contents that do not make sense in daily life. Do not use numbers or alphabets in headings and sub-headings (*Example A. Introduction 1. Body*). Use the following style for headings and sub-headings

## Materials and Methods

The purpose of the research was to analyze the logical-mathematical skills through the quantitative approach of students participating in this study. According to (Vargas-Jiménez, 2012), quantitative analyzes are interpreted from the prediction of the hypotheses and theories studied, resulting in explanations in accordance with existing knowledge. This makes this approach objective in its procedures and handling of information. The level of research was descriptive, by the analysis of facts and phenomena of reality under study, the development of skills is studied according to their causes and effects, the research was field and bibliographic, the inductive method was used and deductive, in this case expanding the information to parents and experts related to the research theme, the synthetic analytical. The techniques that were used in the research are those that allowed collecting field information, to support the criteria of the direct and indirect authors who are the object of studies such as observation, survey and interview, which was applied to a sample of 220 people between parents, administrators, teachers and students.

## Analysis and Discussion of the Results

The research was developed in the first phase in the Jacinto Santos Verduga Educational Unit, Canton Tosagua - Manabí, where there was already a diagnosis of the children's level of learning, especially in the development of skills in the field of Mathematical logic. topics addressed in relation to didactic planning specifically were with the strategies organized in a class plan for each activity to the determined groups and from them, the plans were elaborated, and the activities developed, but above all, motivation plays a very important role for the development of mathematical skills (Alloway, 2007; Simmons et al., 2012; Niroo et al., 2012).

Figure 1 shows the methodology applied by the teacher for the development of skills in the subject of mathematics.

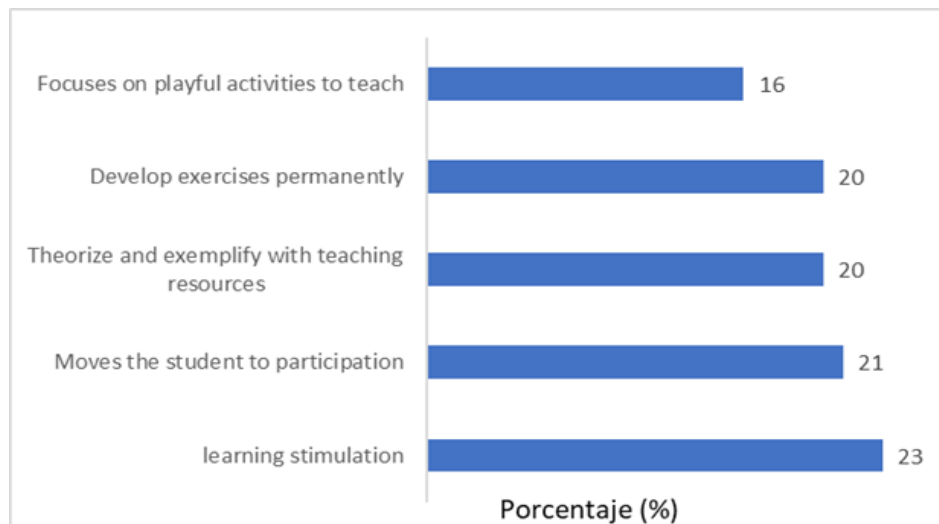


Figure 1. Methodology applied by the teacher

As can be seen, the stimulation of the teacher is one of the most used techniques, this strengthens the teaching of mathematics at the level studied. Another point of analysis and discussion is that children have difficulty in carrying out tasks at home, because parents do not have a level of knowledge that can help their sons and daughters to carry out their tasks, so there is no such adult significant part of socio-cultural theory because to the extent that collaboration, supervision and responsibility for learning are covered, the child progresses adequately in the formation and consolidation of their new knowledge and learning, shown in Figure 2.

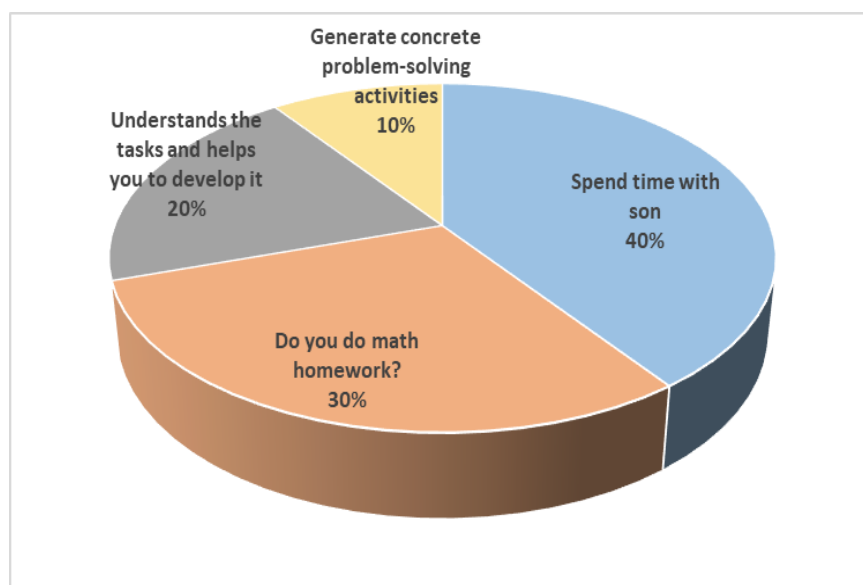


Figure 2. Homework

In which 10% generate concrete problem-solving activities, and in 20% the parents manage to understand the homework and help them to develop it, which is very insignificant. However, 40% spend time with their children, but the problem lies in the parents' lack of knowledge. This perception of the problems in the classroom or the way it is perceived may be linked to the lack of strategies that the teacher when coming into contact with groups of students, does not propose new situations or ways of teaching, as they encouraged a change of attitude, some students were carried away by the strategies worked by the teacher, not having the appropriate results, because when they went to the blackboard, to solve an addition exercise, many did not (Alloway & Passolunghi, 2011; Hannula & Lehtinen, 2005).

It is recognized that educational units must emphasize the search for strategies and contents, especially in the mathematical logical field, that promote better learning, develop better teaching where students are able to learn and developing processes that raise the quality of learning. With the experience and learning lived and shared, it was interpreted as a result that the application of the interviews, survey and interactive cards served to know the theoretical and scientific bases on which the research project was based to delve deeper into the educational reality because the teacher and parent works in a general way and does not respond to the styles that the students have, for this reason, it was possible to take a sample, in such a way that it was possible to record very positive and relevant aspects in the execution of the logical development strategies mathematical, so it is necessary to improve the planning design, since this dynamizes education and projects a more significant learning perspective (Xu & Li, 2009; Darma et al., 2021; Mahayukti et al., 2017).

## Conclusions

The boys and girls of the educational unit have little development of skills in mathematical logic, which can trigger difficulties for the appropriate appropriation of concepts in the solution of exercises. Logical-mathematical development is based on one of the most relevant points, for this reason it was essential to provide children with meaningful experiences and let them know the different strategies there are to learn. The initial education teacher must have a greater appropriation of the game as the main didactic resource, highlighting its benefits such as the

acquisition of high levels of skill in the development of mathematical thinking, in addition to the development of their personality, teamwork, and mood.

#### Acknowledgments

The authors thank the editors of the journal for supporting us in publishing our paper.

#### References

- Abreu, J. (2012). Hypothesis, method & research design. *Daena: International Journal of Good Conscience*, 7 (2), 187-197.
- Alloway, T. P. (2007). Working memory, reading, and mathematical skills in children with developmental coordination disorder. *Journal of experimental child psychology*, 96(1), 20-36. <https://doi.org/10.1016/j.jecp.2006.07.002>
- Alloway, T. P., & Passolunghi, M. C. (2011). The relationship between working memory, IQ, and mathematical skills in children. *Learning and Individual Differences*, 21(1), 133-137. <https://doi.org/10.1016/j.lindif.2010.09.013>
- Ausubel, D. P. (1978). The nature and measurement of creativity. *Psychologia: An International Journal of Psychology in the Orient*.
- Barreno-Salinas, Z., & Macías-Alvarado, J. (2015). Early stimulation to enhance psychomotor intelligence: importance and relationship. *UNEMI Science Magazine*, 8 (15), 110-118.
- Batista, J., Salazar, L., & Cordero, MEF (2001). Development of reading skills in L2 from a constructivist perspective. *Omnia*, 7 (1-2).
- Blanco, L. J., Guerrero Barona, E., & Caballero Carrasco, A. (2013). Cognition and affect in mathematics problem solving with prospective teachers. *The Mathematics Enthusiast*, 10(1), 335-364.
- Brown, J. S., & Burton, R. R. (1978). Diagnostic models for procedural bugs in basic mathematical skills. *Cognitive science*, 2(2), 155-192. [https://doi.org/10.1016/S0364-0213\(78\)80004-4](https://doi.org/10.1016/S0364-0213(78)80004-4)
- Bruner, J. S. (1962). The conditions of creativity. In *Contemporary Approaches to Creative Thinking, 1958, University of Colorado, CO, US; This paper was presented at the aforementioned symposium.*. Atherton Press.
- Castejon, JL, & Navas, L. (2013). Difficulties and disorders of learning and development in children and primary. *Difficulties and disorders of learning and development in children and primary*, 0-0.
- Darma, I. K., Karma, . I. G. M., & Santiana, I. M. A. (2021). Practicality and effectiveness of digital mathematics teaching materials in improving the problem-solving ability for polytechnic students. *International Research Journal of Engineering, IT & Scientific Research*, 7(6), 203-213. <https://doi.org/10.21744/irjeis.v7n6.1935>
- DeCharms, R. (1976). Enhancing motivation: Change in the classroom.
- Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of educational Psychology*, 73(5), 642.
- Gil Madrona, P., Contreras Jordán, OR, & Gómez Barreto, I. (2008). Motor skills in childhood and their development from a lively physical education. *Ibero-American Journal of Education*.
- Gil, CAP (2016). Educational accompaniment as a closeness strategy that promotes student learning. *Virtual Magazine Catholic University of the North*, (49), 1-6.
- Guanga Chunata, D.M. (2016). Analysis of the development of logical-mathematical skills in the learning of students entering the Faculty of Educational Sciences of the National University of Chimborazo in the period November 2012 to September 2013.
- Hannula, M. M., & Lehtinen, E. (2005). Spontaneous focusing on numerosity and mathematical skills of young children. *Learning and Instruction*, 15(3), 237-256. <https://doi.org/10.1016/j.learninstruc.2005.04.005>
- Hernández, CEN, del Salto, VSH, Camino, DSJ, Flores, DGR, & Espinoza, MWN (2018). Social skills in academic performance in adolescents. *SEECI Magazine*, (47), 37-49.
- Mahayukti, G. A., Gita, I. N., Suarsana, I. M., & Hartawan, I. G. N. Y. (2017). The effectiveness of self-assessment toward understanding the mathematics concept of junior school students. *International Research Journal of Engineering, IT & Scientific Research*, 3(6), 116-124. Retrieved from <https://sloap.org/journals/index.php/irjeis/article/view/16>
- Mareschal, D. (2016). The neuroscience of conceptual learning in science and mathematics. *Current Opinion in Behavioral Sciences*, 10, 114-118. <https://doi.org/10.1016/j.cobeha.2016.06.001>
- Medina-Sánchez, N., Velázquez Tejeda, ME, Alhuay Quispe, J., & Aguirre Chávez, F. (2017). Creativity in preschool children, a challenge for contemporary education.

- Merkley, R., & Ansari, D. (2016). Why numerical symbols count in the development of mathematical skills: Evidence from brain and behavior. *Current Opinion in Behavioral Sciences*, *10*, 14-20. <https://doi.org/10.1016/j.cobeha.2016.04.006>
- Muñiz, J., & Fonseca-Pedrero, E. (2019). Ten steps for test development. *Psicothema*, *31*(1), 7-16.
- Niroo, M., Nejhad, G. H. H., & Haghani, M. (2012). The effect of Gardner theory application on mathematical/logical intelligence and student's mathematical functioning relationship. *Procedia-Social and Behavioral Sciences*, *47*, 2169-2175. <https://doi.org/10.1016/j.sbspro.2012.06.967>
- Novak, J. D. (1988). Learning science and the science of learning.
- Passolunghi, M. C., Vercelloni, B., & Schadee, H. (2007). The precursors of mathematics learning: Working memory, phonological ability and numerical competence. *Cognitive development*, *22*(2), 165-184. <https://doi.org/10.1016/j.cogdev.2006.09.001>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, *55*(1), 68.
- Santrock, J. W. (2000). Psychology. International Edition.
- Simmons, F. R., Willis, C., & Adams, A. M. (2012). Different components of working memory have different relationships with different mathematical skills. *Journal of experimental child psychology*, *111*(2), 139-155. <https://doi.org/10.1016/j.jecp.2011.08.011>
- Vargas-Jiménez, I. (2012). The interview in qualitative research: new trends and challenges. the interview in the qualitative research: trends and challengers. *Electronic Journal Quality in Higher Education* , *3* (1), 119-139.
- Xu, H., & Li, D. (2009). Modeling of process parameter selection with mathematical logic for process planning. *Robotics and Computer-Integrated Manufacturing*, *25*(3), 529-535. <https://doi.org/10.1016/j.rcim.2008.03.001>