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Importance of communication for education in the learning of Mathematics.

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ABSTRACT

This essay addressed the importance of communication in the educational field, where it is and always will be an important factor to develop in students, as it is one of the logical and linguistic skills to express ideas and learnings. In addition, to achieve that this communication is inter-disciplined to other subjects and especially to the learning of Mathematics, which is often difficult to exploit in students. It is a challenge for students to reach with coherence, cohesion, and critical sense to communicate their ideas or solution procedures in mathematical problems, being able to express ideas as part of a conglomerate of vocabulary, thinking, and attitudes that the student has in his previous knowledge to face the new learning that directly generates a significant change. Handling the elements of communication for learning mathematics involves placing the student in the roles of sender and receiver of information and not only of information but of knowledge using active methodologies such as the inverted classroom that encourages the student to form his learning and to be able to express what he has learned, since learning mathematics is not only solving problems, mastering procedures, memorizing properties, but to be able to express orally and in

writing what was solved in the problem or exercise using a communication channel and code with logical, precise and very organized ideas, which is why communicating what is learned in mathematics is essential for the advancement of the didactics of mathematics in its methods of problem-solving.

INTRODUCTION

The art of the human being in most cases lies in the way of transmitting and communicating their ideas to others, creating a circle or chain of interest to the information that can be provided. It is because of the above that the main objective of this essay lies in that communication conceives many aspects in which the iteration between people, language, and roles that must be taken to form the link that will be given in the exchange of messages is handled. Therefore, communication in education exerts one of the most notorious roles for the transmission of both knowledge and ideas that favor meaningful learning at all times. Learning in mathematics has been very much focused on educational processes because it is particularly complex in terms of procedures and forms of resolution that require an analysis beyond simple mechanical, memoiristic mathematical operations and handling of properties, currently encouraging problem-solving and interdisciplinarity with other subjects, encompassing the level of communication among teachers.

According to Berelson and Steiner (1964) cited by Gil Ayala (2018), Educational communication is the "act or process that generally consists of the transmission of information, ideas, emotions, skills, etc., through the use of signs and words". Therefore, communication is one of the primordial elements in the exchange of information between teacher-student and not only information but also encompasses the management of emotions in different forms such as oral, written, or signs.

The fundamental purpose of education in Nicaragua is the development of communicative competencies for the integral development of students, a training proposal that is articulated in three axes that will be developed in a transversal manner throughout the teaching-learning process, these are oral communication, reading, and writing. For this learning sector, MINEDUC (2009) cited by Casanova and Roldán (2016) states "that language, that is, oral and written expression is the basis of the other areas of knowledge and constitutes in itself a fundamental tool for the integration of people in a modern, participatory and democratic society" (p. 3). This is achieved through the enrichment and expansion of the language with which students enter the different educational establishments through continuous interaction and improvement of oral communication and access to written language through reading and writing.

DEVELOPMENT

The need to express oneself to others has always been and will continue to be the essential form of a channel of communication between one or more people and mainly as a vital tool for education. Now, the learning of mathematics lies in how oral and written communication is used to be able to correctly and accurately adapt the logical expressions in symbols, letters, numbers, operations, graphs, and solution processes that often require adaptation processes by the teacher in the teaching of this subject linked to the learning of mathematics that is often difficult for students to understand.

The current way of considering the learning of mathematics is the way of devising mathematical learning when it refers to the learning of concepts, definitions, and/or theorems considering that learning is to decompose cognitive and algorithmic structures, produced from simple to complex processes, realizing in a general way that can occur by some qualities as according to Flores (2003) expresses:

1. Mathematical learning is realized through concrete experiences and the level of communication.
2. Learning has to start from a meaningful situation for students to strengthen their oral, written, logical, analytical, and operational skills.
3. How students can incorporate the concept into their mental structure is through a process of abstraction that requires concrete models with simplified representations in the manipulation of objects.
4. One of the ways to make learning meaningful for students is through discovery learning, where they during the process identify and analyze together with the teacher abstractions and ways to solve a problem.
5. There is no single mathematical learning style for all students since it depends on the level of information, they have access to and their study habits. (p.8).

The teaching-learning process of mathematics is extremely complex and over time man has developed a variety of active methodologies such as the inverted[1] classroom, to achieve the effectiveness of this process. With the advent of new technologies, particularly computers and online applications such as Moodle, a new field of research is opening up in terms of new learning environments and teaching methodologies as innovative didactic strategies, taking advantage of the enormous potential of these electronic resources so that the different qualities can be adapted to the new needs of students.

1. Pedagogical model to turn the class around, where the student assumes the central part of the class and forms his/her learning by following an ordered list of activities, with the teacher being a moderator or facilitator of learning.

Based on the above, Hernández and Víctor (2001) quoted by Macías Ferrer (2007) express that:

What is relevant in the learning of Mathematics may be: access to a large amount of information about mathematical objects, but having the skills that allow both the formulation of conjectures about them and how to criticize, correct, and improve them. (p. 11).

The above shows that the information handled by the student in his activity in the learning of mathematics can be achieved through good communication that is evident in the active participation of the student, demonstrating what he has learned with the expression of ideas clearly and accurately, adding the ability to ask truthful questions about the doubts presented on the contents at the time of the class and the teacher's ability to put into practice the role of sender and receiver in the student.

Now, the importance of communication in education for the learning of mathematics constitutes one of the most applied ways of transmitting information and knowledge; That is why, oral expression today is one of the most evaluated parameters in contests[2] and management of oratory skills, trying to explain their ideas in a very clear, precise organization with cohesion and coherence in their speech, this involves the management of vocabulary, reading, and research as part of the student's training.

The communication process must be very emphatic in terms of written, oral, and analytical skills, which are the ones that must be developed as an important aspect of education and especially in learning mathematics since it is one of the sciences in which the student must be able to express in his own words the sequential process he carried out to obtain an answer. However, how learning takes place depends a lot on the level of student-teacher iteration and the degree of contextualization that the teacher uses so that the content is applied and grounded to the competence and achievement indicator of the class. The active participation of the student is fundamental during the development of the class linked to the fact that learning must be active at all times, which is achieved when the student can solve an exercise without prior explanation from the teacher and in the same way explain his procedure fluently and linked to generate a logical sequence of what has been learned with the topic of the day.

One of the challenges of education in the learning of Mathematics in secondary school after the application of the Blackboard Plan Methodology is that this learning is active at all times, always calling to develop and polish the assertive communication in the student, making him/her explain with his/her own words his/her assimilation before and after the teacher's

2. Academic contests to demonstrate reading skills, numerical, logical, concrete, applied problem-solving, and oral expression fluency promoted by the Ministry of Education.

intervention. One of the most used ways to achieve the above-mentioned is the scaffolding[3] that greatly favors the student to seek feasible ways of learning and knowledge.

The teacher is the most responsible for good communication to exist very often in the classroom, since the message and code transmitted by the teacher must be effective for the student to interpret and correctly carry out his learning, assuming the roles of sender and receiver according to the moment of the class.

There is no doubt that in education how the information is presented to the student, will be in some way significant because it is the duty of the teacher that it is not by traditionalism.

The use of ICTs increases the effective process of communicating what is to be transmitted to the student, achieving the ideal process of communication in the different types of knowledge:

Diagram 1

The sequence of knowledge to achieve communication

Source: Prepared by the authors

Within communication and information technologies, part of the previous knowledge that the student is well known to have is when new content is presented to him/her. Of course, it may be superficial knowledge that was learned indirectly and that can be related to the new knowledge, thus causing a change in the cognitive and conceptual structure of learning, however, within the complexity of mathematics, the student's prior knowledge greatly enhances the process, so any knowledge that he/she has and can communicate it is important.

The importance of communication in the educational context is reflected in an integral way within the contents to be developed, this is part of the conceptual and scientific formation, in the same way, attributed to the use of didactic materials that complement the didactic strategies that undoubtedly, help the student to learn mathematics, in most cases help to reaffirm and modify the knowledge in an intuitive, safe and practical way that when taken to the application in situations of the environment that generates significant changes in their learning, which is why it becomes one of the relevant aspects that the student can explain and apply what they have learned.

3. Scaffolding constitutes a provisional mediation and structure for the teacher for the construction of new learning.

Educational communication has as a fundamental pillar the exchange of information, procedures, knowledge, and attitudes in a direct way since they contribute to the student's ability to enhance their skills and discover others even without knowing them. Therefore, the learning of Mathematics follows guidelines with communication and nowadays with the management of emotions, approaching that the experience with the induced practice is an innate ability of the human being to communicate and relate their learning with different areas in their lives, since they learn to advance cognitively and effectively realize their accumulation of ideas, forming conceptions, maximum attention and assimilation of the information that is provided to the student to realize the transformations and restructuring of learning, together with the skills and indicators of achievement.

Adding to the above Matamoros (2021) explains that communication within Mathematics:

It is to generate a hierarchy of knowledge that allows establishing compatibility in the methodology for learning, where the didactics must remain in the teacher unifying with his scientific knowledge, being the key point to be able to transmit to the students what he wants them to learn; but the most surprising of all this process is that the student manages to establish a very strong link with reality being able to apply what he has learned to situations of everyday life and thus taking it to interpretation, analysis, and applicability with logic and certainty. (p.29)

Within the education and didactics of Mathematics, communication processes arise that are linked to intentionality in a habitual way about the interests that the student uses in learning. Therefore, it is required that the student builds concepts, and performs logical and coherent analysis in the solutions of problems leading to the learning of vocabularies, terms, and operations within Mathematics, establishing one of the transcendent importance within communication, which is to express clearly what was understood, forming the learning directly linked to the development of logical thinking.

CONCLUSION

In conclusion, the importance of communication in human beings is part of an innate ability that contributes to the formation of learning, and in mentioning the mathematical, it encourages the logical and coherent structuring of operational and applicative processes that highlight the educational practice, to be the most effective to achieve the fulfillment of skills in the student opting to exploit the oral and written part. Within mathematical learning, this should be integrated at all times by the teacher-student relationship, as part of a continuous

iteration in knowledge, numerical skills, emotional management, and expressing their concerns, so that the construction of knowledge is more didactic and easy to handle by the teacher.

Mathematical learning using communication is vital to understand, interpret, contrast, verify, apply, and value the logical and operational mathematical structures with graphs and relationships that contribute to meaningful learning with methodological strategies and that its didactics provide to achieve these proposed skills leading to its maximum application in practice generating as an important result in the learning of concepts and mathematical properties in problem-solving.

That is why the core lies in the union of previous knowledge that the student has to agree on a new learning and, therefore, successfully generates a cognitive change in his mind, and thus can apply what he has learned to the world around him, explaining in his own words the algorithm solution route that he executed to give his answer to the problem.

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