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Research Article

Analysis of Teaching Practices in Mathematics and Language Teachers of Public Institutions in Valledupar

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ABSTRACT

This article underscores the importance of teaching practices in mathematics and language teachers as a fundamental tool that goes beyond writing simple numbers and formulas on a blackboard. Their objective is to analyze the teaching practices of mathematics and language teachers in Valledupar. When identifying the methodologies used by teachers in the teaching of mathematics and language in current education and when analyzing their effectiveness, it is observed that, in the classroom, a traditional approach that hinders students' deep and meaningful learning continues to predominate. Despite the fact that teachers are aware of innovative methodologies, there is resistance to change due to factors such as lack of resources, training and institutional support.

This qualitative, descriptive, non-experimental research is based on semi-structured interviews and observations; A sample of 10 students and 15 teachers from 5 public institutions of Valledupar - Cesar was taken, where the great knowledge of teachers about innovative tools that come before their usual pedagogical practices was evidenced, a continuous improvement in the teaching work is proposed, where active tools are involved with the intention of promoting skills and abilities in students, that help them improve their quality of life. It is based on pedagogical theories such as the processes of mathematical thinking from the initial age of Margarita Marín, the significant learning of David Ausubel, the flipped classroom of Ana Elena Coto, the STEAM approach of Chris Beers and the logical, social and critical thinking of Clavijo and Fresneda, a call is made to educators to imagine the teaching of mathematics.

Keywords: Mathematics, Language, practices, innovation, methodology, teaching.

INTRODUCTION

This research outlines a process of analysis in the teaching practices in the classroom by teachers from Valledupar based on the theories of Reimers and Chung (2016), they point out that the Latin American context has shown slow progress in the adoption of innovative methodologies. At the national level with the theory of Mejía and Peña (2020), where low motivation is reflected, when the student fails to see the practical applicability of mathematical knowledge in everyday life.

At the regional level, mathematics education and quality are marked by inequality factors, Patiño and Ramírez (2022) point out that, although attempts are made to promote problem solving, with the use of manipulative resources, there is resistance to abandoning traditional methods due to lack of continuous training, which reduces students' interest and makes mathematics seem irrelevant. In local educational institutions, teachers present specific challenges regarding the teaching of mathematics, according to the statements of García, et al. (2018).

Although mathematics teachers are familiar with various modern teaching strategies and tools, many continue to use traditional forms of teaching, this persistence in the use of outdated modes limits the effectiveness of meaningful

learning, which manages to transform thinking that leads to continuous improvement with teaching practices in the quality of life.

When discussing educational institutions in Valledupar, it is inferred that they are not alien to the behavior experienced in the rest of Colombia and Latin American countries, regarding the learning of the area of mathematics, here they face very similar challenges, framed by the pre-existence of traditional methods that limit the importance of this area.

For this reason, it was decided to carry out a research that can be understood by teachers and according to their self-demand, they manage to transform their pedagogical practices with the intention that each topic given in the classroom is applicable in the daily life of each student in their environment, contributing to a continuous improvement in their quality of life. Therefore, the objective of this study was to analyze the teaching practices of mathematics teachers in public institutions in Valledupar.

1.1 Evolution of mathematics teaching

Mathematics has evolved over time, learning must be active and the processes of mathematical thinking must be encouraged from an early age, such as the following: thinking and reasoning, communicating, representing, posing and solving problems and using the formal and technical language of operations (Marín 2021). Thinking and reasoning allows one to have the ability to explain in an argumentative way what one thinks after an analytical process. It is an important skill for formal reasoning that begins before the early childhood education stage. Logical reasoning begins before the child begins his school process and is continuously developed by his experiences at the beginning of preschool. Children of these ages use a mixture of combined processes of methods to justify their responses, including:

- Perception, empirical tests, short chains of deductive reasoning. (Marín 2021). In relation to communication, it is important to keep in mind that it begins to develop in the mathematical field from a very early age. The development of this is influenced by the level of maturity, the way in which language is modeled, and the experiences and opportunities for expression that are given to it. Because of this, it is essential to encourage the child to verbally express the activities carried out, using their own words. This process should be guided with patience and support, helping him to organize and clarify his ideas when necessary, in order to acquire skills to communicate through mathematics. The process of representation is closely linked to that of communication. Through representation, ideas are captured in different codes that allow them to be shared with others.

The core of mathematical understanding lies in the ability to represent ideas and connect these representations to mathematical concepts. These representations contribute to making mathematical ideas more concrete and accessible for analysis. To facilitate the understanding and representation of mathematical ideas to children, it is important to offer a variety of tools, such as oral and written language, gestures, drawings, diagrams and symbols, both those created by them and conventional ones, also integrating technological resources. On the other hand, identifying the similarities between different ways of representing a situation contributes to the development of the capacity for abstraction. At this stage, the teacher is responsible for creating a learning environment that motivates and stimulates children to explore and use different forms of representation. Also when we are faced with problem solving at this initial age of the educational process, it is essential that the teacher establishes a relationship of trust, stimulating the child's capacity for intelligence, curiosity and flexibility to solve problems according to the grade and context.

It should be clear that in each school year the level of complexity increases beyond the basic, secondary and middle schools, while continuing to stimulate all the processes contained in mathematical thinking, adequately promoting the formal and technical language of operations. It should be noted that there are currently countless interactive game activities of any age and school grade that potentiate each process of this mathematical thinking, which the teacher must use in his teaching practices and not limit himself by finding resources that allow the effectiveness of learning.

1.2 Teaching methodologies

Teaching methodologies are a set of approaches and techniques that teachers employ to guide and facilitate student learning in practice. These can vary their approaches from traditional perspectives to more innovative methods, where each one uses different characteristics to reach the same educational objectives.

According to (Tapia & Murillo, 2020), the traditional teaching methodology focuses on the figure of the teacher as the main transmitter of knowledge. One of the major goals in the teaching of mathematics is the application of

strategies for true learning. This poses challenges for teachers today who, for the most part, do not want to detach themselves from the traditional educational model of teaching, as a consequence of these methods is the presence of unmotivated students with marked shortcomings in the learning of mathematics. This approach dates back to very ancient academic times based on the oral transmission and memorization of information by students. Immediate change is required where learning is meaningful. where students relate new information to mathematical concepts that they already know, as stated by David Ausubel's theories, which is based on connecting knowledge with previous experiences. Currently in the context of mathematics teaching, this traditional method can limit the meaningful understanding of concepts, since, by focusing only on memorizing formulas and procedures, their practical application is not understood, although it has the advantage of being able to transmit knowledge to a large number of students at the same time.

On the other hand, the innovative teaching methodology puts the student in the central position of the learning process, implementing a more personalized perspective and adapted to the individual needs of each student, an example of this is the flipped classroom that according to the analysis of some authors is understood as the result of a process of transformation in the school classroom. to direct the student to deepen his or her own knowledge, promoting his or her leading role inside and outside the class, ensuring that theory and practice are simultaneous, thus evidencing true knowledge. When the teacher and students are in the classroom, innovative experiences are carried out that corroborate through practice the learning of the previously established contents. Mathematics is immersed in all fields and teachers in this area like to be at the forefront of novelty, however, when it comes to implementing these innovative methods they feel limited, this is a good alternative that can be implemented and achieve optimal results with students. "The flipped classroom offers the possibility of knowing the subject before arriving at the classroom and solving doubts from the beginning of the lesson. (Coto, 2021) with this methodology, the student develops their learning outside of class, through ICTs. One of the objectives of the Flipped Classroom is to maximize the time established for face-to-face classes, because the student studies previously at home and in the classroom, doubts are clarified and what has been learned is optimized. The flipped classroom is a novel pedagogical model where students through videos and interactive activities learn the content of the class at home, and in the classroom with the guidance of the teacher their learning is put into practice, what was usually done in the classroom with this teaching method is now done at home and what was done at home is stimulated at home. class.

1.3 Innovations in methodology in the teaching of mathematics

The teaching of mathematics has evolved significantly in recent years, due to the need to adapt to new technologies and academic demands, in addition, this innovation process focuses on the integration of emerging methodologies and advanced technologies that help to improve the conceptual understanding of knowledge and its practical application by students. (Medina – Matute et al. 2024)

These innovations have changed the way this subject is approached, making learning a more interactive and flexible dynamic for each student. Some of the current innovation techniques that stand out the most are project-based methodologies, the use of digital technology and the STEAM approach (Chris Beers, 2016), which combine mathematics with science, engineering, technology and art, thus promoting active learning that allows students to apply their knowledge in practice, promoting a comprehensive development of these skills. These tools help students interact directly with mathematical concepts, making their learning less abstract and more intuitive, making it easier to understand and retain such knowledge in the long term.

By combining this type of approach with learning mathematics and connecting this knowledge with the events of their daily lives, students stop seeing mathematics as a separate subject and begin to see it as a tool to face and solve problems in diverse contexts, increasing not only their interest, but also helping them to develop critical thinking that allows them to face different situations in more complex environments. In order for these innovative methods to be effective, it is important that the teacher is constantly updated and prepared to face the challenges involved in his or her true role as a teacher and guide of this process, effective learning must be reflected in the classrooms, where students demonstrate advanced mathematical knowledge, A novelty, based on a universal language, is not only that the teacher says how much he knows, how much is updated with the new tools, but that he stops using the board with the marker less to lead his students to demonstrate mathematical knowledge and thinking in practice.

1.4 Mathematics in the cultural context and reality of students

Mathematics education, analyzed from a critical approach, underlines the importance of context in the education of students. Fresneda-Patiño (2021) highlights that mathematical learning does not only occur in the classroom, but also in the implicit knowledge that students bring with them. In this context, the role of the teacher goes from being

a simple transmitter of information to becoming a guide who promotes active participation and the exchange of meaningful experiences, thus encouraging the development of critical thinking through this approach. Fresneda-Patiño (2021) also proposes that education awakens the curiosity of the student through questions and problems that connect with human values, inviting them to actively participate in their learning process, combining practice and theory to enrich their knowledge.

Clavijo and Fresneda (2020) also address the development of logical thinking from a social and critical perspective. In his vision, the classroom should function as a micro-society that fosters democratic principles, open debates, and values such as solidarity and responsibility, this environment allows students to reflect on real problems and use mathematics in practice to make fundamental decisions. An example of this approach was carried out by Clavijo and Fresneda (2020), it is a case study on the motorcycle, where students analyzed topics such as environmental pollution, the financial system, and marketing, demonstrating how mathematics can address relevant social problems.

Both research highlights the value of Critical Mathematics Education, connecting mathematical knowledge with real experiences, this approach presents mathematics as a cultural and social tool, capable of transforming educational practices and enriching the daily lives of students.

Mathematics education undoubtedly needs a deep analysis, it is necessary to take into account the context of the student and the environment of the institutions, which allows to potentiate through symbolic technology the skills inherent to the teaching of mathematics, such as counting, locating, measuring, calculating, among others, combining them with experiences that connect the student with their daily lives. Mathematics education must allow the discovery and liberation of students' limitations by creating recreational environments that integrate everyday knowledge with the topics of the area.

2. METHODOLOGY

The research is of qualitative approach, allows the exploration and analysis of teaching in mathematics teachers, with a type of descriptive study, which characterizes teaching practices, with a non-experimental design since it does not intervene in the environment or modify conditions. The population was made up of 15 teachers and 10 students from the 5 public institutions of Valledupar, 3 teachers and two students from each institution were interviewed. The data collection instrument was carried out through a script of open questions, which guided the conversation, allowing the exploration of emerging topics for study (Hernández Sampieri et al., 2014) and records that systematically reflected direct observation of teachers' practices in the classroom, as it occurs in their natural environment (Angrosino, 2012).

CHARACTERIZATION OF PEDAGOGICAL PRACTICES		
Category	**Analysis**	**Answers**
Traditional vs Innovative Methods	Comparison of traditional and innovative approaches in mathematics teaching.	• Teachers prefer traditional methods for safety and ease. • Students are asking for more interactivity, but traditional methods predominate.
Barriers and challenges	Identification of obstacles in the implementation of innovative methods.	• Lack of time and resources limits the implementation of innovative methods. • Traditional methods are considered more effective for certain students or concepts.
Training and institutional support	Relevance of continuous training and institutional support in the adoption of new methodologies.	• Continuous training is key, but not all teachers have access to it. • There is no clear support from the institution for the implementation of new methodologies.

Classroom Implementation	Reflection on the implementation of new methodologies and their frequency.	• Some teachers try innovative methodologies, but it is not frequent due to how demanding it is. • Classes usually focus on the use of the blackboard and repetitive exercises.
Openness to new suggestions	Teachers' attitude towards new ideas proposed by students.	• Some teachers are open to changing their approach, but most stick to traditional methods.
Knowledge of methodologies	Evaluation of teaching knowledge on new teaching methodologies.	• Teachers are aware of new methodologies, but prefer to continue with traditional methods for safety.

3. RESULTS

According to the descriptive analysis, the following findings could be obtained in the observations of the classroom classes.

- The vast majority of teachers use traditional and conventional methods, such as explanatory masterful expression on the blackboard, with assigned repetition exercises. Some with allusion to the knowledge of methodologies with innovation, but almost null in their application, affected by limitations of time and resources, although they manifest according to semi-structured interviews, to use the two methodologies and get the best out of both, leaving aside the skills to solve problems with critical thinking, preferential attachment to their comfort zone with the methods of imminent mastery is observed.
- Factors such as lack of training, excessive workload and precariousness with a lack of resources in the institution, teachers experience a lack of institutional support to work with new methodologies, however, resistance to change is evident when they express that students do not receive the arrival of novel activities well. Most students do not experience feeling motivated with deep satisfaction towards mathematics classes, they generally consider that those topics are not interrelated with real situations. In addition, they insist on the need to apply more practical and participatory methodologies, with projects and actions interacted allowing greater interest to be added.
- Teachers contrast the curriculum, according to theory and practice, it is necessary to raise awareness to make mathematics classes more interesting and visualize them as a transformative area of lives. The application of interviews reveals the main contentions, to implement innovative methods to promote a motivational environment in both teachers and students.
- Unity of criteria between teachers and students was evidenced, in the face of the issue that mathematics enjoys important recognition and is necessary in multiple scenarios, demonstrating the divorce between what is taught in classroom classes and its applicability in the real world. Teachers express their interest in adopting and adapting new methodologies that impact the daily life of their students.
- With the innovation of innovative methods on the teaching of mathematics, it is pertinent to implement under inclusive support policies in the continuous training of teachers with access to school supplies and other necessary resources. These not only seek a significant improvement in the quality of teaching but also the stimulation of students' demands towards much more solid and contextualized learning.

4. CONCLUSIONS

The teaching of mathematics has been fundamental since ancient times, both teachers and students recognize its importance in different areas, worldwide. Despite the fact that in today's education there are innovative methodologies in the classroom, a traditional, repetitive, rote methodology continues to persevere, where the teacher does not leave his comfort zone, and students stick to the development of algorithmic formulas and operations.

A historical and theoretical context is provided on the challenges and advances of mathematics teaching and theoretical foundations that guided the study and helped to better understand the reality of mathematics teaching in classroom teaching practices and the need for a change towards more effective and relevant methodologies.

Deficiencies in the understanding of the topics in the area of mathematics, both theoretical and practical, were addressed, which allowed the comprehensive analysis of the problem and the interest in implementing innovative methodologies that benefit teachers and students in the teaching-learning process.

This research reveals the urgent need to transform current educational practices; Adopting innovative and relevant approaches, facilitating more meaningful learning that prepares students to face challenges and challenges in real contexts, thus promoting their integral development and their ability to apply mathematics in daily life.

5. RECOMMENDATIONS

It is suggested that teachers take into account:

Analyze their pedagogical practices, developing each lesson plan with a specific intention that connects students with their reality and context, so that mathematics topics are not only abstract, but can also transform their quality of life. By relating mathematical content to real and practical situations, through creative and/or technological methodologies where students not only develop academic competencies, but also applicable skills that allow them to understand and improve the world around them.

Implement training programs that contribute to continuous improvement and minimize barriers that prevent the use of innovative methodologies, establishing monitoring mechanisms that continuously evaluate the process.

To encourage innovation in teaching practices by creating motivating environments that promote experimentation with mathematics, implementing didactic resources, facilitating the understanding of knowledge specific to the discipline where updated topics are integrated, linking real situations that are of interest to students and that allow them active participation and effective learning manifested both in the classroom and in their daily lives.

Develop mathematical thinking from preschool with creative methodologies and interactive games, which contribute to a progressive and continuous increase in reasoning, communication, representation and problem solving.

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