

Pedagogical guidelines for the development of competences that strengthen the teaching practices of the mathematics area

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Abstract. The present study is aimed at promoting the use of pedagogical guidelines to strengthen the practice of the teacher of mathematics, through the use of specific competences of the area, in this sense the present research focuses on what happened in the process of teaching mathematics from pedagogical approaches proposed by the “Ministerio de Educación Nacional”, Colombia, as a result, it is proposed as a general objective to promote the use of pedagogical guidelines based on the Singapore model to enhance the teaching of mathematical skills, in order to be able to face the challenges of new educational spaces thought as transforming elements of the educational reality. On the other hand, this research is contextualized in the educational institutions “Lucio Pabón” in Ocaña and “Confanorte” in Los Patios, Norte de Santander, Colombia, to achieve such purposes, a qualitative ethnographic methodology was used, and field since it intends to interact with the object of study and its incidence in reality. For this, three teachers from the area of mathematics in each institution were selected, considered as key informants, since they will be in charge of supplying the diagnostic information and, from there, emphasizing the qualitative method using triangulation as the main method of analysis, from which emerged some categories that ensured the need to transform the praxis of the teacher, for this reason a proposal based on the Singapore method and on mathematical competences has been designed for the teachers of the indicated context.

1. Introduction

The teaching of mathematics is one of the issues that causes more controversy when talking about the educational processes that are experienced in the classroom, the teacher finds a diversity of factors or elements involved in the student so that this reach school success, they can be focused from the inside or from the outside, but each one of them affects in a positive or negative way depending on what the student is expected to achieve their learning; that is, there are factors that act as variables that interfere or, on the contrary, act favorably when motivating students to behave in school [1].

The teaching of mathematics is considered a series of elements that are worth considering, since it is one of the most difficult disciplinary areas to teach [2]. That is why it was possible to demonstrate as results of the development of this research, that there is a disarticulation between what is taught and the way it should be done, since the teacher has not yet understood, what are the pretensions of the “Ministerio de Educación Nacional (MEN)”, Colombia, with the establishment of pedagogical guidelines to train in this area of knowledge, another significant fact told as a finding is the wrong reason that is held because teachers believe that the use of new information technologies is one of the guidelines expressed by the Colombian system for teaching of mathematics, shifting the Singapore method aside and not allowing it to be developed [3].



The students of the educational institutions analyzed show a decrease in the results of the state tests of evaluation of communicative competences, abstract reasoning and problem solving. This motivates this research in the sense of establishing a possible solution to the problem using pedagogical guidelines based on the Singapore model as a tool to improve teaching practice in such a way that teachers' competencies are developed in search of generating meaningful knowledge and developing mathematical competencies in their students [4,5].

The design of the proposal is oriented in pedagogical guidelines that allow restructuring the reality object of study, to the point that the Singapore method can be articulated, focused on learning mathematics without memorizing, as the didactic means that promote the reasons of knowledge in the environments of classes, for this purpose, the protocols emanating from the MEN in Colombia were considered to generate expansion and deepening programs in relation to the Singapore method, product of the theoretical analysis proposed as a basis to explain the educational reality in the current moments, so that an approach that serves to transform the academic spaces of Colombian education, in terms of teaching mathematics.

2. Method

This study is framed within a qualitative paradigm, based on the Ethnographic approach [6,7]. The research seeks to interpret the initial categories proposed in the study through the application of interviews and structured observation to demonstrate the teaching strategies used by teachers and how they develop their competences in the area of mathematics at the educational institutions "Lucio Pabón" in Ocaña and "Confanorte" in Los Patios, Norte de Santander, Colombia. Based on the results, a didactic proposal is established using pedagogical guidelines based on the Singapore model, encouraging dialogue and criticism among students and teachers [8,9]. As an initial approach to the educational reality that can be perceived in this context, Figure 1 presents the categories of pre-established analysis.

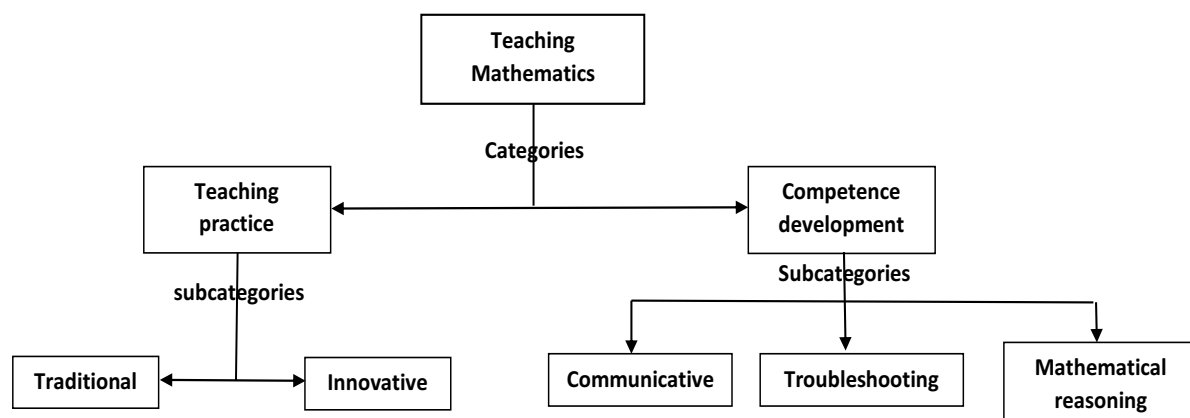


Figure 1. Categories of analysis.

3. Results

The present investigation was based on the applicability of research instruments, which gave sufficient information, about the strategies used in the area of mathematics for the development of the respective competences, to identify the problems that arose and to present a possible solution to the latent needs in the context studied; this instrument is the semi-structured interview, applied to teachers who are part of the population and study sample.

The analysis of this information was made taking into account the discourse of the teachers for the interview, the practices and behaviors of these during the classes and their responses, hence emerging categories to decode the results and generate a triangulation to give interpretation to the information obtained. For the purposes described above, it is intended to generate a representation of emerging categories, so that the reader can clearly see the highlights that emerged from the interviews conducted.

3.1. Emerging categories

To systematize the results obtained, it is systematized into categories that emerged from the discourse analysis of the teachers interviewed, which can be seen in Figure 2.

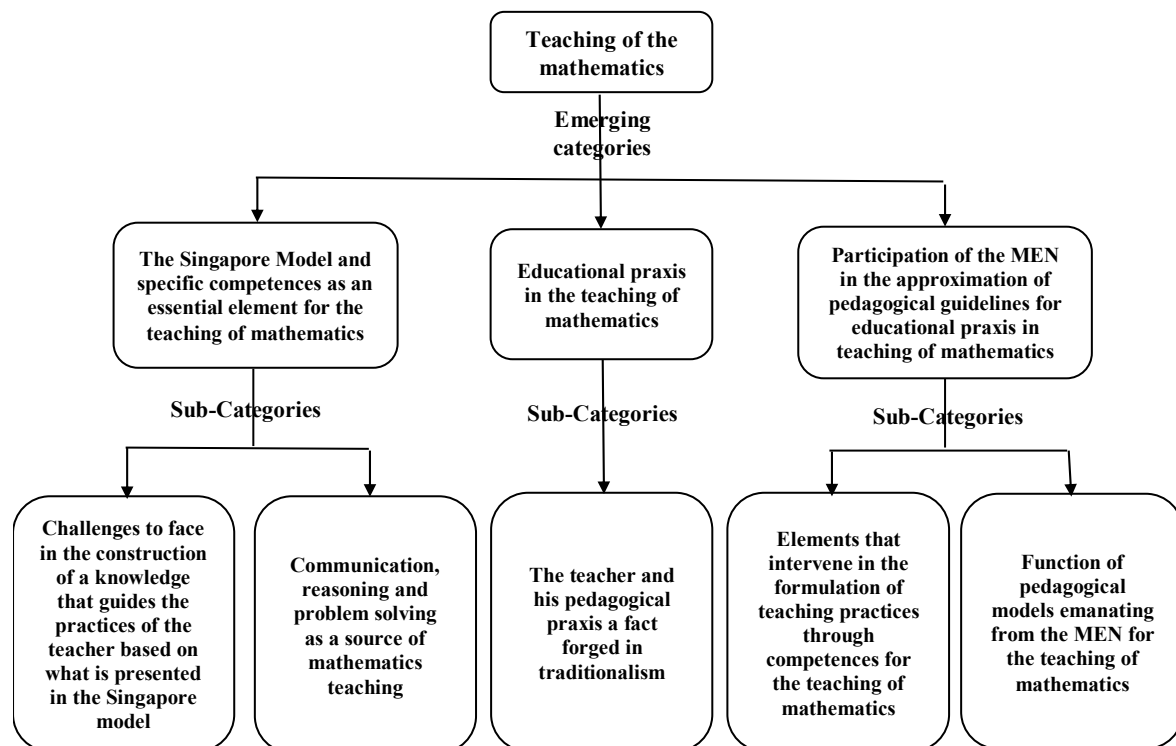


Figure 2. Emerging categories.

From the process of analyzing the results, three categories emerged based on the discourse handled by the teachers interviewed, which are: educational praxis in the teaching of mathematics; participation of the MEN in the approximation of pedagogical guidelines for the educational praxis in the teaching of mathematics and the Singapore model and the specific competences as an essential element for the teaching of mathematics in the current times.

3.2. Analysis of the emerging categories

The process of teaching mathematics becomes a key point in the development and integral learning of the students, in the sense of facilitating knowledge, attitudes and abilities, so that they can develop in the planes and spheres in which this is required, that is to say, that competences are strengthened that allow the student to assume the challenges of everyday life, of the formal and practical aspects that reality presents as evidence, to which it must be effectively answered, for the achievement of personal and school goals, therefore the teacher must develop a practice that is close to the needs raised by students.

Given this, the teacher must be an administrator guarantor of compliance with an assertive didactic, and timely for the development of elementary skills, which are multifaceted useful for the student in their real life; In this regard [10] states that "the modern teacher should dynamist and enrich through their pedagogical practice the interests of students becoming a wise and caring guide that helps the adolescent to build their own education", this translates into accommodate all his pedagogical intervention towards the student, being attentive to his circumstantial need, which determines the direction of the educational task and the achievements that can be obtained. The explicit and cited can

also be deepened in the use of innovative strategies, using a methodology congruent to the avant-garde demands.

Teachers seem to be very familiar with traditional strategies, and although they know what the value of pedagogical praxis is, a process of greater reflection that includes the transformation of that way of thinking has not emerged, and as is to be known, the strategies of traditional cut, centered fundamentally in the domain of the textual and direct information of specialized documents, that the teacher to assume literally as they appear there, and as it is in essence where the rigor is framed with protocols that even include old and outdated practices. From this point of view, it is seen with concern the learning processes that are developed up to here by the teachers, as well as the possibility to limit the development of competences that the pedagogical practice possesses, to face the realities of life from the knowledge that has the area of mathematics.

From this point of view it can be understood, according to the arguments presented by the teachers that the strategies developed by them in the school under study, is predominantly traditional, mainly focused on the fluctuating construction of knowledge detached from the students' academic needs, which highlights a low utility of strategies that use experiential, practical, innovative and incentive activities, so that the student manages his own learning and strengthens through it, the skills that are required in his day to day.

4. Discussion

In the teaching of mathematics, a series of strategies that determine what the learning process will be; this is seen as the set of coordinated and conscious actions that are carried out by the teacher, to guarantee the success of the learning of mathematics, reaffirming that teaching implies the planning and execution of pedagogical activities for the achievement of the desired contents. Specifically, the teaching of mathematics seeks to define the laws that govern the dynamics of the classroom activity through pedagogical strategies developed in the guidelines of the MEN for the achievement of the integral education of the student, in this sense, the validity of the memorization, the repetition and the fixation of notions and concepts, constitutes a worrisome situation in the teaching of mathematics in Colombia, because it contrasts this way of learning so traditional with the development of emerging complex and uncertain circumstances [11]. Hence the demand for a renewed educational action that trains citizens as actor's critical protagonists of events and not as apathetic, submissive and alienated spectators.

In view of this, a model is required that quickly adapts to the educational dynamics of today's society and at the same time takes full advantage of the individual's own resources, understanding that this seems to be the basis of the new educational paradigm. In this sense, pedagogy and didactics have improved the field of education, integrating it to the new foundations of education in accordance with the present, this is how it is observed in developed countries, a modern and updated education from the point of social view, whose techniques and teaching methods prepare students to obtain significant learning and manage to face the challenges presented in their daily work.

Colombian education has always been considered as an action to instruct, to be liberated and governed by a thought of its own that proposes to encourage and train a human being according to their valuable possibilities; It is also a process where skills are developed to positively face a social and integrating environment, for that reason [12], in addition, it seeks the constitution of habits that allow adapting and reacting adequately to external situations of its natural and social life. However, it is necessary to constantly search for techniques and methods that contribute to improving the teaching processes developed by teachers.

On the other hand, it is necessary to highlight the role of the teacher, as a mediator, between the learner and their knowledge in relation to the educational system, also, within an educational action through the guidelines established by the MEN in Colombia, requires an open attitude, showing self-confidence, developing skills to perceive the classroom educational reality as it is presented, at the same time, generating critical, reflective thoughts, research and its training activity must be related to the management of strategies and resources that in a certain way allow transcend educational thinking, before a teacher raises, that "Guidelines I understand that this is, curricular Mayas everything that the

MEN gives us to follow the classes." Therefore, the teacher is in need of creating a space for pedagogical interaction and that the school is the space that helps to form educational experiences and to understand the need to fight individually and collectively for a more just society or to influence the modification of it, or to satisfy the current demands of the Colombian society that seeks for 2025 to be one of the most educated countries in the continent.

It is there where the need arises to consider what happens in the current educational field, specifically when trying to impart the knowledge related to mathematics. Where they mark great significance some factors that affect the proper development of teaching in this area of knowledge and the result are no more, that a teaching detached from the needs of current societies, therefore, we must focus on the way in which one is trying to teach emphasizing in the reflection that the teacher must do in order to improve the reality to which it is subject. Therefore, another teacher says that "my model is the old one: board, teacher, student".

In sequence with the above, we see that the teaching of mathematics meets the need to undergo changes that aim to renew the way it is taught, transcending the social and pedagogical reality of educational institutions in Colombia, mainly those of primary level such as the case of the educational institution "Lucio Pabón" in Ocaña, Colombia, trying to ensure that these implications do not hinder the inclusion of new pedagogical trends emanating from the MEN, which promote the development and evolution of mathematical knowledge, in this sense there is evidence of teaching that is largely detached from the pedagogical needs immersed in today. On the other hand, it is evident the lack of inclusion of a new approach that allows the compression, representation and analysis of mathematical knowledge characterized by its didactic foundations and by a totally renewed understanding of the educational reality.

5. Conclusions

It was evidenced that most of the teachers under study have a low level of use of the mathematical competences proposed by the MEN.

In relation to the management of the appropriation of mathematical competencies for teaching, it could be shown that, although teachers know them, several of them prefer to rely on the pedagogical models of the institution before taking these guidelines and the MEN guidelines as a reference for the development of their teaching practices.

The results allow inferring that the strategies used by the teachers, object of study, for the teaching of mathematics, focus on pedagogical practices that promote memoristic and repetitive learning, without generating processes of reflection and numerical comprehension based on the knowledge imparted in the classroom. There is a tendency towards a teaching practice that should be based on contextualization and experimentation where the student learns by doing and living from his or her own reality, allowing the teacher to include and incorporate methodological elements specific to daily life, so as to consolidate meaningful learning.

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