

# Mathematics Teaching: Assessment of Process and Practice in Early Stages of Educational System

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*Abstract*— The current orientations, approximately mathematical education, imply the want to favour the acquisition of mathematical competitions from the primary a long time. It is uncovered, besides the truth that during those ages the numerical understanding is key for different mathematical leanings, and there may be emphasized the significance of the mathematical tactics to gain as a result a higher performance within the day by day existence. With the aim of analysing the practices of education of the wide variety of the teachers of the first a while (4-8 years), and to analyze at the presence of the mathematical strategies, an instrument has been designed by using precise indicators that permit to examine the presence (or no longer) of these processes within the above stated practices. The instrument of evaluation includes five categories that represent 5 mathematical strategies proposed by means of the National Council of Teachers of Mathematics (NCTM, 2000): decision of issues, reasoning and test, verbal exchange, connections and representation. For each of the kinds there contribute seven signs of evaluation. The analysis of the information goes to permit to explain, first, the strengths and weaknesses in the practices of schooling gaining knowledge of of the mathematical techniques; and secondly, relevant statistics goes to be received to return it to the lecturers, to speak about and to give them precise guide in terms of the important expertise for the pedagogy of the belief of quantity in childhood.

**Key words:** Teaching And Learning, Mathematics Teaching, Educational System, Early Stages, Childhood, Assessment

## I. INTRODUCTION

Current orientations, inside the subject of mathematics schooling, record the importance of favouring the purchase of numeracy from early age, for the reason that all those, who apprehend and can use mathematics, may have an increasing number of opportunities and alternatives to determine their future.

In the joint announcement (NAYEC and NCTM, 2013) on mathematics in child education said that one of the ten key suggestions for teachers to attain a mathematics training of excellent is to use curriculum and teaching practices that beef up the kid tactics of trouble solving and reasoning, in addition to representation, communiqué and connecting mathematical ideas.

In several preceding articles, we have made a few progress to comprise the work of the content in connection with the mathematical processes in the classrooms of toddler schooling, with the purpose of empowering literacy and mathematical competence of the children of the first a long time (Alsina, 2011, 2012). In this work approximately the presence of fashionable techniques in teaching and getting to know practices of the perception of quantity in the first ages, it is assumed that the planning, management and assessment of teaching practices that contain the mathematical procedures in a systematic manner, as gear to

work the exceptional contents in general, and the numerical specifically due to its relevance in the first ages, calls for to increase benchmarks that permit us to analyse the presence (or now not) of the tactics in those practices. From this perspective, it's far supplied within the first region a short precis of the contributions of the research in arithmetic schooling and educational psychology toddler approximately mastering the wide variety inside the first a while; secondly, the technique of the NCTM (2000) with regard to the mathematical knowledge, which considers 5 standards of content and five preferred approaches; and finally, the description of the system of validation of an tool for assessing the presence of the mathematical techniques within the practices of coaching and getting to know of the perception of wide variety in early formative years training.

## II. PREDECESSOR

### A. Conception of numerical on teaching and learning process

There have arisen diverse studies on the mathematical development and the acquisition of the notion of number in the childish stage, as for example the Logical Model Piagetiano (Piaget and Szeminska, 1967) or the Model of Integration of Skills (Baroody, 1998; Fuson, 1988; Bermejo, 1990), among others.

First is that the development of logical reasoning is the basis of the development of number and arithmetic skills, however, it arises subsequently emerging approaches that hold that the mathematical development goes hand in hand with the development of logical thinking, for example children acquire an understanding of the extent number while they have counting enriching experiences, which involve complex cognitive processes for achieving the concept of number and logic operations management.

Furthermore, according to Baroody (1998), there is little evidence of the need for logical training for developing the concept of number, however, there is evidence showing that counting experiences are directly related to the understanding of number sense. In this line, Bermejo (1990), among others, favours a comprehensive approach due to the necessary complementarity between the teaching of logic operations and numerical skills, considering that both are indispensable skills that develop the complex cognitive processes, allowing a greater understanding of number.

Having these elements present, teaching and learning of the concept of number in the first ages should include an understanding of numbers and operations, relationships between numbers and operations and forms of representation (NCTM, 2000) in a variety of meaningful learning contexts that promote learning these aspects through mathematical processes thereby empowering numeracy (Coronata & Alsina, 2012).

### B. Process of mathematical implementation

The NCTM (2000) provides two types of mathematical knowledge: mathematical content (numbers and arithmetic, algebra, geometry, measurement and data analysis and probability) and the mathematical processes (problem solving, reasoning and proof, communication, connections and representation), which reveal the ways of acquiring and using mathematical content:

- Problem Solving, which involves building new mathematical knowledge to reflect, use and adapt strategies that promote problem solving situations. Having opportunities to solve mathematical problems, students generate new ways of thinking, habits of persistence, curiosity and confidence, noting the usefulness out of school.
- Reasoning and Proof, which allows students to be more aware of the meaning of mathematics and how it offers powerful alternatives in order to understand a variety of phenomena. It is developed to investigate mathematical conjectures, to develop and evaluate arguments and demonstrations.
- The communication, which ultimately is a tool that promotes interaction with others to clarify
- Mathematical ideas, to strengthen communication, ideas become objects of reflection, precision and discussion. Besides, communicating with arguments, students learn to be clear and convincing in the use of mathematical language, and at the same time, to hear the explanations of others, deepening their own understandings of mathematical ideas.
- Connections in mathematics are built by thematic links. This discipline is an integrated field of study. It is necessary for students to recognize and make connections among progressive mathematical ideas and also it is important that to consider mathematical connections with other subjects or topics and the everyday life to understand better their usefulness.
- The representations, which correspond to the ways of representing mathematical ideas, which could be through pictures, concrete materials, tables, graphs, numbers, letters, and more. Many representations that exist today are a result of a cultural construction, which took many years to determine. When students understand mathematical representations presented to them and have opportunities to create others, improve their ability to model and interpret physical phenomena, social and mathematical.

It is from this vision of mathematics education that an instrument is designed to assess the presence of the mathematical processes in teaching practices of the notion of number in early childhood education.

### III. METHOD IMPLEMENTATION

The analysis tool includes five categories that correspond to the five mathematical processes proposed by the National Council of Teachers of Mathematics (NCTM, 2000). For each of these categories are provided seven indicators of evaluation. These indicators are designed to analyse classroom practices previously recorded audio-visual format, although they may be used in situations of direct

observation. In the table below shows, for example, an indicator on each process, considering that these indicators are still under review:

Initial Processes of Mathematics	display
Approach of Problem Solving	Proposes broad problematic situations which are valid in different solutions.
Approach of Reasoning	Promotes children verify conjectures of everyday life.
associations	Make connections between number contents and other mathematical content.
communiqué	Supports for children to be heard in relation to the different ways of thinking and observe in their points of view on the understanding of the numbers, what they are, etc.
symbol	Displays a bidirectional work in developing the notion of number (from the concrete to the abstract and from the abstract to the concrete).

Table 1: Some indicators drawn from the "Tool for Evaluating the Presence of Mathematical Processes Practices in Teaching-Learning of Number Notion in Early Childhood Education."

In the validation section of the tool are considered the following:

- 1) Degree of correspondence, to determine whether or not every specific indicator belongs within the class, in keeping with the definition given.
- 2) Formulation, to set the language used in each indicator.
- 3) Relevance to establish the diploma of relevance of the indicator relative to the class.

Simultaneously, from Angoff Method (1971), there may be a minimum presence of the proposed signs, to peer if it is present or absent every class. This of fashionable putting approach, that's the most frequently used, generally includes 3 levels (orientation, schooling after which two rounds of performance estimation). The existence of several versions on these processes, our take a look at has been adapted to the professional consultation and at a round of overall performance estimation for each of the types. In this manner, professionals endorse estimations and calculate the average of all the estimations to set the same old putting. The estimations for every check item are averaged, and the averages are used to determine the reduce-off rating.

The tool has been subjected to professional judgment at Latin American nations like Chile, Argentina, Peru and Mexico, and america, Belgium and Spain, with a complete of 23 experts worried in education and arithmetic schooling within the early a while.

We are currently analyzing the facts furnished with the aid of specialists to expand then the final version of the tool.

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