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"BEAKS AND SNOUTS" WE SOLVE ALL (PRIMARY AND SECONDARY SCHOOL)

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INTRODUCTION

Learn math to solve problems… or solve problems to learn math? With a general strategy and a wide range of specific strategies, the same problem can be answered from different ages, regardless of mathematical concepts and procedures. In addition, a realistic problem can be a perfect script to approach the learning of other mathematical knowledge.

OBJECTIVE

Attend to the diversity of thought and reasoning of our students in the area of mathematics, specifically in problem solving.

Fully develop problem-solving skills in Preschool, Primary and Secondary Education students, so as to improve general academic performance and in Language and Mathematics in particular.

PROPOSAL

Problem solving is a priority content in the Mathematics area because it is a means of learning and reinforcing content, it gives application meaning to the area and allows interaction between the different knowledge and evaluation criteria, as well as other areas.

In the methodological approaches, it must be taken into account that students must develop and perfect their own strategies, while acquiring other general and specific ones that allow them to face new situations with a probability of success. As José Antonio Fernández Bravo says "you have to start from successful situations" [5].

To achieve student motivation, the problems must be well selected, with simple statements, all of them taken from situations and contexts that facilitate the acquisition of content.

The problems must be drawn from situations that start from the reality of the students, and from imaginary situations that are attractive to the student. It is interesting to propose open problems with increasing difficulties.

The terms "problem" and "exercise" are quite often confused. A problem can be defined as a situation in which it is intended to achieve a goal whose achievement is blocked, either due to lack of resources, information... The subject must not know a priori the path to reach the goal, because if not, no It would be a problem, it would be an exercise. For a situation to be considered a problem, it must exist:

- A person who wants to solve it
- An initial state and a final state (goal to achieve)
- Some type of impediment to the passage from one state to another

We will put a problem to exemplify how to approach problem solving learning in the different educational stages. In this specific case, we will focus on the second and third cycle of Primary and Secondary. This proposal will be complemented by the one that will be presented by the classmates of Pre-school and the first cycle of primary school, since they will solve the same problem or another similar problem in earlier stages, using simpler strategies that connect with the first phase of Bruner, which is none other than manipulation through modeling, favoring its resolution with the hands and the deepening of mathematical content.

This methodological proposal has been promoted jointly by the Ministry of Education, Universities, Culture and Sports of the Government of the Canary Islands and the Isaac Newton Canary Society of Mathematics Teachers for several years through the Canary Newton Mathematics Project (MNC). Bruner's phases and problem solving are

followed, according to Polya and Shoenfeld, Miguel de Guzmán and Manuel García Déniz adapted to Primary and Secondary.

The general strategy deals with four basic sequenced processes: "understand", "think", "execute" and "respond" (POLYA, [6]). For this reason, an orderly and systematic thought scheme is worked on, which includes specific problem-solving strategies as well as the associated logical diagrams.

"The phase of "understanding" consists primarily of the search for the data in the statement of the problem, in its enumeration, analysis and classification, as well as in the determination of the objective that the problem seeks, that is, the question that it poses. The connection between the objective and the data (relationship) must also be established. This connection allows determining the consistency of said data with the objective, thus eliminating inconsistent data (not necessary) or searching for those that are not explicit.

In the "thinking" phase, the representation is developed (tree diagram, double input, parts/whole, truth table, linear diagram, etc.) and the analysis of what was obtained in the previous phase (the objective of the problem and the explicit or implicit data related to the objective), thus obtaining the most convenient strategy to achieve the objective of the problem, that is, to answer the question that it formulates.

In the "execute" phase, the diagram or representation obtained in the previous phase is transformed to mathematically represent the situation and to develop that inherent mathematical form of the relationship between problem and objective data. The use in this phase of a certain mathematical procedure (logic, numbers, algebra, etc.) will depend on the selected strategy to make explicit the structure of the initial information (data) and its relationship with the objective.

Finally, in the "respond" phase, the context is reconnected (with the statement of the problem and with its language) to verify the correctness of the response found in the phase.

Above and to also verify the coherence of the response with the objective to be achieved, that is, to verify if the question posed by the problem is really answered (RUPÉREZ Y GARCÍA-DÉNIZ, 2006, 2012a, 2012b). ([4] State School Board)

We will present the "beaks and snouts" problem and "how much money do they have" and we will see how to solve it using specific information organization, trial and error and modeling strategies, which will allow us to attend to the diversity of thought and educational level.

RESULTS

The results have been published in the state school board [4] and in the Canary Islands school board [3].

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