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Levels of arithmetic reasoning in solving an open-ended problem.

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Summary: This paper presents the results of an experimental teaching carried out on 12-year-old students. An open-ended task was given to them and they had not been taught the algorithmic process leading to the solution. The formal solution to the problem refers to a system of two linear equations with two unknown quantities. In this mathematical activity, students worked cooperatively. They discussed their discoveries in groups of four and then presented their answers to the whole class developing a rich communication. This study describes the characteristic arguments that represent certain different forms of reasoning that emerged during the process of justifying the solutions of the problem. The findings of this research show that within an environment conducive to creativity, which encourages collaboration, exploration and sharing ideas, students can be engaged in developing multiple mathematical strategies, posing new questions, creating informal proofs, showing beauty and elegance and bringing out that problem solving is a powerful way of learning mathematics.

Classification: D50 F30 H30

Keywords: arithmetic; reasoning; solving simultaneous equations with arithmetic; problem solving; multiple solution strategies; whole-class discussion; justification

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