

SYMBOLIC EXPRESSIONS ADOPTED BY PUPILS ANSWERING TO A WORD PROBLEM

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In this article we study the answers to a word problem given to 69 pupils of 7th grade of a “multicultural” school in Greece. This problem was an adapted version of a problem proposed, among others, in several research projects by Sowder (1988), and by Lester et al (1989). The adapted version reads as follows: “*A teacher plays the following game with her pupils. Each pupil would exchange a teacher’s one hundred drachmas coin with lower value coins, excluding the one drachma coin. How many pupils could play this game if each exchange should be made in a unique way?*”

Greek language was not the mother tongue for 12 of the pupils. Although there was, partly, some misunderstanding of the problem (some pupils constructed questions of their own in a way similar to that described in Lean et al (1990)), it seems that being part of a linguistic or ethnic minority (e.g. albanian, russian, gipsy etc.) does not seem to be a significant factor, that affected the understanding of the problem.

Of particular interest are the symbolic-arithmetic expressions (or forms) adopted by pupils in their answers, in order to represent the various ways of exchanging a 100 drachmas coin. A large part of the symbolic-arithmetic forms we refer to sometimes resemble arithmetic «mononyms» and «polynomials», where the structural units represent the «basis» elements (50, 20, 10, 5 and 2 drachmas). For example: « $5(2) + 2(5) + 1(10) + 1(20) + 1(50) = 100$ » or « $100 = [10 + 10 + 10 + 10 + 10] \cdot 2$ » or even in «exponential»(!) form « $5^{10} + 2^{20} + 2^5 = 100$ ». We would like to emphasize that a variety of symbolic forms as above could not probably be achieved without the particular verbal context of the problem. It has been argued that only the development of non-verbal mathematical activities can support cognitive activation and “integration” of pupils who are socially isolated due to linguistic problems. Our research provides some evidence that this claim does not seem to be fully justified.

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