

FIRST GRADERS' AND KINDERGARTEN CHILDREN'S KNOWLEDGE OF GRAFIC SYMBOLE SYSTEM OF NUMBERS AND ADDITION AND SUBTRRACTION

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The initial process of teaching mathematical numbers and addition and subtraction is undertaken using a graphic symbol system.

The graphic symbol system, as well as other symbolic systems, is characterized by being arbitrary, accepted and transferred information. It also has its special "symbolic components" such as the symbols of the numbers figures and its "model of using symbols" i.e. the right order of writing the exercise symbols in mathematics (Lesh & Doerr, 2000).

Before children enter school, they have already acquired some informal knowledge about the mathematical graphic symbol system. when they start school, they begin a formal learning of this symbol system (Bialystok, 2000).

This study has examined the knowledge of kindergarten children and first graders concerning the "symbolic components" and "models of using the symbols" of numbers and addition and subtraction exercises using a graphic symbol system. A special item was developed for the purpose of the study. The study includes 154 respondents (48 kindergarten children and 106 first graders). Each child had an individual session in which he was asked to produce and identify natural numbers and addition and subtraction exercises using a graphic symbol system.

It was found that when first graders could not produce or identify the numbers or the addition and subtraction exercises, it was mainly a result of lack of knowledge or misconceptions about the "symbol usage model".

Conversely, the causes of the difficulties in those tasks for the kindergarten children involved both "symbolic components" and the "symbol usage model". These findings may cast light on the development stages of two central aspects in young children's knowledge development of graphic representation of numbers and addition and subtraction exercises. In the presentation, I provide examples of items and details from the results.

References

Bialystok, E. (2000). Symbolic representation across domain in preschool children. *Journal of Experimental Child Psychology*, 76, 173-189.

Lesh, R., & Doerr, H. M. (2000). Symbolizing, communicating, and mathematizing: Key components of models and modeling. In P. Coob, E. Yackel & K. McClain (Eds.), *Symbolizing and communicating in mathematics classrooms: Perspectives on discourse, tools, and instructional design* (pp.361-384). Mahwah, New Jersey: Lawrence Erlbaum Associates