TEACHERS' KNOWLEDGE ABOUT THE EQUATION CONCEPT

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The purpose of this study is to analyse how teachers in mathematics understand the equation concept. Furthermore my goal is to investigate what kind of previous experiences the teachers have had of their own concept learning. Ten teachers in mathematics in the secondary school participated in the study. Five teachers were newly graduated and five were experienced. Data was gathered by interviews and questionnaires. Tapes were transcribed into protocols and interpreted to categories of conceptions by the phenomenographical research method (Marton and Booth 1997). The results indicate that the teachers have different kinds of misconceptions of the equation concept. They are insecure both to the mathematical symbols, the letter expressions and the solving procedures. Their experiences at school suggest that they have spent most of the time to develop procedural skills instead of mathematical understanding. Their acquired experiences of the concept learning have formed their concept images (Vinner 1991). These are not identical with the concept definition. For some of my teachers an equation does not constitute a mathematical statement. The equation concept is for them closely linked to other difficulties like variables, unknown factors, the roles of the equality sign, the meaning of the mathematical symbols, the role of the formal definition and the solving procedures. The process-object duality of the mathematical notation (Sfard 1991) creates fundamental problems for teachers. They have considerable problems in leaving the process level and entering the object level and there is no difference between the newly graduated and the experienced teachers. Concept definitions help us to form a concept image, but they do not guarantee understanding of the concept. Teaching mathematical concepts with understanding requires different kinds of metaphors, various examples, non-examples, language, situations and so on. It presupposes that teachers have mathematical and pedagogical knowledge and skills and a rich image of mathematical concepts.

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