CAN STUDENTS DEFINE ABSTRACT CONCEPTS: USING GENERALIZATION PRINCIPLE IN LEARNING ALGEBRAIC STRUCTURES

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Generalization as a mathematics activity takes significant place within the research on the learning and teaching of mathematics. It is necessary to say that though the generalizing process in didactics of mathematics (as well as the method of generalization in mathematics) is quite known (Mason et al, 1985), having various directions for research and using in teaching, it has been little used for teaching algebraic structures to students. Our theoretical position is grounded in the theory of active learning processes in mathematics (Hiebert, 1992; Wang, Haertel and Walberg, 1993). We would like to consider the possibility of the using methods of active learning combining both didactic ideas and research methods in mathematics itself. It may make clear how the process of teaching mathematics can be constructed similarly to the process of mathematical research and how this kind of teaching contributes to the development of students' mathematical thinking. While studying algebraic structures using generalization principle, on the first stage of the interview 78 first year undergraduate students were given a questionnaire having 21 tasks of different kinds for two aspects of generalizing process in order to find out directions and priorities of students' mathematical thinking, first of all their abilities to define abstract concepts while studying this theme under given conditions. We took into consideration that to support mathematically thinking one needs a questioning, challenging and reflective atmosphere (Mason, 1985, p.153). 61 students were able to define the concept of a group on their own having meanwhile constructed the local theory of the group S_n. 13 students independently came to the concept of a semigroup studying generalized permutations. The second stage of the interview concerned students' motivation in learning under the given conditions. 11 questions were proposed to the same students to find out their priorities and dislikes in learning this theme.

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