The Application of APOS Theory and Group Work in Teaching of the Topic of Logarithmic Equations

Ågota Figula, **Emese Kása** University of Debrecen, Debrecen, Hungary

In our research, we would like to find an appropriate categorization to measure the mathematical knowledge and thinking processes of high school students. Furthermore, we would like to check, how can the students teach each other during group work, and how affect it to their performance, motivation and activity. We tested 11th grade students who had studied mathematics at an advanced level. They learned the topics of logarithmic equations, inequalities and equation systems for 20 lessons and wrote many tests. We split the tasks of the tests into items, and we used the APOS theory (action-process-object-schema) to measure the mathematical skills of the students. If a student could complete a certain number of items, he reached the appropriate level of APOS model. After the learning all of the topics the pupils get group work exercises. We formed four groups from the students in the group work. In a group there are students with different abilities, and they had should explain the solutions of the tasks and share their thoughts with each other. After the group work they wrote again tests. We used the previous items to observe their thinking processes and with the help of Fischer's exact test we checked, how could benefit the students with different abilities from the experiment. We found that the performance of most pupils will be better. They have been placed in a higher category of APOS theory, and they were more active and more motivated on the lessons. Therefore we think, that it is useful to find an appropriate categorization to measure the mathematical skills of our students. Furthermore it can be helpful for pupils at all levels when we give students of different abilities cooperative exercises.

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