USING PERMUTATION GAMES IN THE TEACHING OF FUNCTIONS

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Function is a commonly used concept in mathematics, and its teaching often poses serious challenges for teachers. In my presentation, I am answering the question of whether permutation games can make it easier for primary and secondary school students to understand the concept of function. I will cover some permutation games in detail and their mathematical background as well. I will briefly describe the history of the concept of functions and its appearance and development in school textbooks. Then I will present my own research about using permutation games in the teaching of functions.

During my research, one of my goals was to try out some permutation games with students to find out how understandable this topic (which is only taught at the university level) is for a student in public education. Furthermore, if it is understandable, how easy it is for them to acquire and use this knowledge. I believe that this playful approach helps to overcome math phobia, and, through permutations, students can see another approach to interpreting functions, perhaps making it easier to introduce functions defined on infinite sets.

To answer my questions, I presented the 15 puzzle and the condition of its solvability in 14 classes. I tried to make a good atmosphere during the classes and made time for explorations and listening to students' ideas to observe how much they liked the topic. Besides having fun in math class, effectiveness was important, too. At the end of the lessons, each student had to complete a test. The result and students' reactions were encouraging: A about 80% of the students were able to write the starting position as a product of cycles.

After the 15 puzzle, I played three different swapping games with 3 classes. I wanted to transfer the knowledge students gained during these games to functions, however, I have not had enough time for that yet. The experience so far is very promising, so it is worth pursuing this topic further. Students are interested in different games and are happy to play with them. Moreover, based on the results, it seems possible with serious preparations to make the essence of functions understandable with the help of games.

- [1] Z. DIENES, Építsük fel a matematikát, SHL Hungary Kft., Budapest, 1999.
- [2] A. SFARD, On the dual nature of mathematical conceptions: Reflections on processes and objects as different sides of the same coin, *Educational Studies in Mathematics* 22 (1991), 1–36.
- [3] D. TALL, S. VINNER, Concept images and concept definition in mathematics with particular reference to limits and continuity, *Educational Studies in Mathematics* 12 (1981), 151–169.