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The Role of Sonification in the Development of the Concept of Function for Blind Pupils

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Abstract

This paper describes our initial steps towards adapting new technological research tools in Hungarian math education for visually impaired pupils. The didactic research starting point was the MathTrax[1] software developed by NASA in 2006.

In our new method we are not replacing but rather enriching different modes of function representation by means of sonification. Most importantly, we want to enable our pupils (seven early blind, aged 13-14) to develop the ability to change their mode of representation of functions. These representations are: formulae, verbal descriptions, tactile graphs, coordinate plane adapted for the blind, 3D columns of varying heights and sound.

Our method helps visually impaired pupils break down the structure of a mathematical problem, and this can lay the foundation for its solution. In addition, it also simplifies complex situations and makes abstract concepts more concrete, and thus more familiar. Furthermore, once the structure of problem is understood the ability of visually impaired pupils to read tactile diagrams improves. Morever, using our method communication between teachers and pupils is strengthened by means of hand gestures.

[1] "MathTrax is a graphing tool for middle school and high school students to graph equations, physics simulations or plot data files. The graphs have descriptions and sound so you can hear and read about the graph. Blind and low vision users can access visual math data and graph or experiment with equations and datasets." http://prime.jsc.nasa.gov/MathTrax/