

STUDENTS' CONCEPTIONS OF CONTINUITY: A CONCEPTUAL CHANGE APPROACH

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The concept of continuity is fundamental to understand many mathematical concepts such as real numbers, limit, functions, etc. While research studies highlight that students have considerable difficulties in understanding the continuity concept, more studies about the sources of these difficulties are needed. According to conceptual change theory, learning occurs as a change in prior knowledge structure either as enrichment or as reorganization. Even a reorganisation is necessary for some mathematical concepts; it is not common for students to change their prior knowledge structure. Hence, prior knowledge prevents new information to be comprehended, which results in the construction of misconceptions (Vosniadou, 1994). In this study, role of prior knowledge and experience in students' conceptions of continuity were explored based on the conceptual change approach.

The participants of this study were five undergraduate students (19 to 21 years-old), from a university in Turkey. All students had taken a calculus course; hence they were familiar with advance mathematical concepts. In order to grasp students' understanding of the continuity concept, a test was developed based on related literature. The test included open-ended definition, identification, and construction problems related with continuity concept. After completing the test, each student was interviewed. Students' written and oral responses constitute the data of this study.

The analysis of data revealed that (1) students' prior experience with the use of word "continuous" in daily life, (2) their physical intuitions derived from their everyday experience of physical reality, (3) their prior knowledge and experiences of natural number concept have a role in their conceptions of the continuity concept and these factors create obstacles in their understanding of the concept of continuity.

The findings suggest that the prior knowledge about natural numbers is needed to be reorganised for the extensions to more advanced mathematical domains. For this reason, it can be suggested that design and implementation of the learning environments for the concept of continuity should pay considerable attention to the reorganization of prior knowledge.

Reference

Vosniadou, S. (1994). Capturing and Modeling the Process of Conceptual Change. *Learning and Instruction*, 4, 45-69.