Abstract

The topic of continuous functions is an important one in Calculus 1 courses, which are often offered in the first year of University. In the mathematics education literature, this topic has been found to be a particularly challenging one for students. The purpose of this study is to gain a better understanding of why this is the case. In order to do so, I use a commognitive approach to analyse certain aspects of students’ discourse on continuous functions.

The participants of the study were 54 first year university students taking a Calculus 1 course. The data consists of written questionnaire answers from all 54 students and video recordings of semi-structured interviews with four selected students out of the 54. Sfard’s (2008) commognitive framework was used to analyse data focusing mainly on the realization trees for a continuous function of the four interviewed students. The design of the questionnaire and interview took into consideration how students would respond to two different definitions of continuous functions. Extending prior research on students' mental representations of continuous functions, this study focuses on how students communicate about continuous functions and the process of discourse along with its patterns and mechanisms.

In particular, I focused on two definitions for continuous functions (and for continuity at a point) from the literature, which in some cases lead to inconsistent conclusions with respect to continuity of a given function. In this study, I identify a number of realizations of continuous functions (different ways in which students communicate about a continuous function) and discuss how some of these realizations are challenged when functions with different domains are presented.

Keywords: Continuous functions; Commognition; Realization tree; Commognitive conflict