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Students' Reasoning about the Concept of Limit in the Context of Reinventing the Formal Definition.

Researchers (Bezuidenhout, 2001; Cornu, 1991) have noted the vital role limit plays as a foundational concept in analysis. The vast majority of topics encountered in undergraduate analysis are built upon understanding the concept of limit and being able to work flexibly with its formal definition (Bezuidenhout, *ibid*). The purpose of this study was to: 1) Develop insight into students' reasoning about limit in relation to their engagement in instruction designed to support their reinventing the formal definition, and; 2) Inform the design of principled instruction that might support students' attempts to reinvent the formal definition of limit. In separate teaching experiments, two pairs of students successfully reinvented a definition of limit capturing the intended meaning of the conventional definition. Analyses of the data generated in the teaching experiments revealed thematic elements of students' reasoning in the context of reinvention. This paper traces the evolution of the students' definitions over the course of two ten-week teaching experiments, and highlights thematic findings which point to what might be entailed in coming to reason flexibly and coherently about limit and its formal definition. (Received September 16, 2008)