

**ZMATH 2016f.01151**

**Fernández-Plaza, José Antonio; Simpson, Adrian**

**Three concepts or one? Students' understanding of basic limit concepts.**

Educ. Stud. Math. 93, No. 3, 315-332 (2016).

Summary: In many mathematics curricula, the notion of limit is introduced three times: the limit of a sequence, the limit of a function at a point and the limit of a function at infinity. Despite the use of very similar symbols, few connections between these notions are made explicitly and few papers in the large literature on student understanding of limit connect them. This paper examines the nature of connections made by students exposed to this fragmented curriculum. The study adopted a phenomenographic approach and used card sorting and comparison tasks to expose students to symbols representing these different types of limit. The findings suggest that, while some students treat limit cases as separate, some can draw connections, but often do so in ways which are at odds with the formal mathematics. In particular, while there are occasional, implicit uses of neighbourhood notions, no student in the study appeared to possess a unifying organisational framework for all three basic uses of limit.

*Classification:* I30 I20 C30

*Keywords:* limits; advanced mathematical thinking; definitions; card-sorting; phenomenography

doi:10.1007/s10649-016-9707-6