

ZMATH 2014b.00683

Nagle, Courtney; Moore-Russo, Deborah; Viglietti, Janine; Martin, Kristi

Calculus students' and instructors' conceptualizations of slope: a comparison across academic levels.

Int. J. Sci. Math. Educ. 11, No. 6, 1491-1515 (2013).

Summary: This study considers tertiary calculus students' and instructors' conceptualizations of slope. Qualitative techniques were employed to classify responses to 5 items using conceptualizations of slope identified across various research settings. Students' responses suggest that they rely on procedurally based conceptualizations of slope, showing little evidence of covariational reasoning. In contrast, instructors' responses demonstrated a multi-dimensional understanding of slope as a functional property, which applies to real-world situations and plays an integral role in the development of key calculus concepts. While relatively diverse, the instructors' responses seldom reported determining increasing or decreasing trends of a line from its slope. This conceptualization was used frequently by students and could help them better understand how slope ties to positive and negative derivatives. The most frequently used conceptualizations for students in this study align with past research findings on the emphasis of the secondary mathematics curriculum, supporting the possibility of cultural influences (academic and geographic) on individuals' conceptualizations of slope. Thus, this study provides valuable insight into conceptualizations of slope and provides direction for future research on slope and the broader topic of cultural influences on mathematical meaning.

Classification: I25 I45 C35 C65

Keywords: instructors; school-to-university transition; slope; sociomathematical norms; students
doi:10.1007/s10763-013-9411-2