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The concept of slope: comparing teachers' concept images and instructional content.
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Summary: In the field of mathematics education, understanding teachers' content knowledge and studying the relationship between content knowledge and instructional are both crucial. Teachers need a robust understanding of key mathematical topics and connections to make informed choices about which instruction tasks will be assigned and how the content will be represented. *L. Ma* [Knowing and teaching elementary mathematics. Teachers' understanding of fundamental mathematics in China and the United States. Mahwah, NJ: Lawrence Erlbaum (1999; ME 1999d.02385)] described this profound understanding of fundamental mathematics as how accomplished teachers conceptualize key ideas in mathematics with a deep and flexible understanding so that they are able to represent those ideas in multiple ways and to recognize how those ideas fit into the preK–16 curriculum. Slope is a fundamental topic in the secondary mathematics curricula. Unit rate and proportional relationship introduced in sixth grade prepare students for interpreting equations such as $y = 2x - 3$ as functions with particular, linear behavior in eight grade. The focus on relationships with constant rate of change leads to distinctions between linear and non-linear functions and the idea of average rate of change in high school. Ultimately, these ideas prepare students for instantaneous rates of change and the concept of a derivative in calculus. The diversity of conceptualizations and representations of slope across the secondary mathematics curriculum presents a challenge for secondary teachers. These teachers must work flexibly and fluently with various representations in the many contexts in order for their students to build a coherent, connected conceptualization of slope. Since secondary mathematics teachers need a deep understanding of slope to mediate students' conceptual development of this key topic, the study reported here investigates both how teachers think about and present slope.

Classification: I29 I49 C39 D39
Keywords: slope; teachers' concept images; teachers' content knowledge; rates of change; derivative; instructional knowledge; linear functions; non-linear functions