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Moseley, Bryan James; Okamoto, Yukari; Ishida, Junichi

Comparing US and Japanese elementary school teachers' facility for linking rational number representations.

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Summary: Using cognitive ethnography as a guiding framework, we investigated US and Japanese fourth-grade teachers' domain knowledge of key fraction representations in individual interviews. The framework focused on revealing cultural trends in participants' organization of knowledge and their interpretations of that organization. Our analyses of the interviews, which included a representation sorting task, indicated three major differences that defined US and Japanese teachers' approaches to rational number representation: (1) Japanese teachers interpreted all rational number representations as conveying primarily mathematical information, whereas US teachers interpreted only some representations as conveying primarily mathematical information; (2) the US teachers focused more intently on part-whole relations than Japanese in their interpretations; and (3) Japanese teachers more easily linked rational number representations to more advanced upcoming content in the curriculum. A review of US textbooks used by the teachers reflected their consistency with US teachers' interpretations of the representations. These findings imply that strong cultural differences underlay the approaches that teachers in both nations take to rational number representation and that these differences may help explain established cross-national differences in student reasoning.

Classification: F49 C69 C39 D39

Keywords: cognitive ethnography; cross-national research; cultural differences; fraction representation; rational number understanding; teacher knowledge; primary school teachers

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