

DESIGNING ASSESSMENT ITEMS FOR MEASURING PCK FOR PROPORTIONAL REASONING

Chandra Hawley Orrill
UMass Dartmouth
corrill@umassd.edu

Martha Epstein
UMass Dartmouth
Mepstein1@umassd.edu

Kun Wang
UMass Dartmouth
Kwang1@umassd.edu

Hamza Malik
UMass Dartmouth
Hmalik1@umassd.edu

Yasemin Copur-Gencturk
University of Southern California
copurgen@usc.edu

Keywords: Teacher Knowledge; Assessment

Conceptual Framework

Measures of teacher mathematical knowledge are notoriously difficult to develop (e.g., Orrill et al., 2015). This is in part because of the multidimensional nature of teacher knowledge. As part of two separate projects being undertaken by this research team, we have attempted to write assessments of teacher pedagogical content knowledge (PCK) in the area of proportional reasoning. Building from Shulman's (1986) conceptualization of teacher knowledge as comprised of content knowledge, pedagogical knowledge, and PCK, we have attempted to write items that capture only PCK. To this end, we endeavored to write items that measure PCK to teach proportions separate from the knowledge needed to solve proportions. The specific topics focused on analysis of student work, assessment of student understanding, planning for teaching, and issues of implementation (e.g., Smith & Stein, 2018).

The purpose of this poster is to report on findings from our development efforts. In prior papers, we have reflected on some of the challenges in writing items to measure teachers' specialized content knowledge (e.g., Orrill et al, 2015). In this paper, we reflect on our analysis of think-aloud interviews to identify what we have learned about the development of PCK items for proportional reasoning.

Methods

Data were collected on two assessments, one tied to an online course and the other being developed for broader use. As part of the item validation process, five in-service middle school teachers were interviewed for the first assessment and 11 were interviewed for the second. Teachers' responses to each item were analyzed to determine whether the item was measuring the intended knowledge as well as whether the item was interpreted by teachers as intended.

Findings

In this poster, we will report on some of our main findings related to the development of PCK items. These include teachers' reactions to the items, elements that obscure the measurement of PCK, and other observations about the interaction of CK and PCK.

Acknowledgments

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A180392 to the University of Southern California and by the National Science Foundation through DRK-12 grant 1813760. The opinions

expressed are those of the authors and do not represent views of the Institute, the U.S. Department of Education, or the National Science Foundation.

References

- Orrill, C. H., Kim, O-K, Peters, S. A., Lischka, A. E., Jong, C., Sanchez, W. B., & Eli, J. A. (2015). Challenges and strategies for assessing specialized knowledge for teaching. *Mathematics Teacher Education and Development*, 17(1), 12-29.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Smith, M. S., & Stein, M. K. (2018). *5 practices for orchestrating productive mathematics discussions* (2nd ed.). National Council of Teachers of Mathematics.