CHANGING POPULATIONS: USING THE PSMS WITH TEACHERS

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Using a test for a purpose it was not intended for can promote misleading results and interpretations, potentially leading to negative consequences from testing (AERA et al., 2014). For example, a mathematics test designed for use with grade 7 students is likely inappropriate for use with grade 3 students. There may be cases when a test can be used with a population related to the intended one; however, validity evidence and claims must be examined. We explored the use of student measures with preservice teachers (PSTs) in a teacher-education context. The present study intends to spark a discussion about using some student measures with teachers. The Problem-solving Measures (PSMs) were developed for use with grades 3-8 students. They measure students' problem-solving performance within the context of the Common Core State Standards for Mathematics (CCSSI, 2010; see Bostic & Sondergeld, 2015; Bostic et al., 2017; Bostic et al., 2021). After their construction, the developers wondered: *If students were expected to engage successfully on the PSMs, then might future grades 3-8 teachers also demonstrate proficiency?*

Methods

Data came from three sources: (a) an expert panel content review, (b) Rasch (1980) modeling of PSM scores, and (c) consequences from testing data from PSTs and PSM administrators. 178 PSTs from a Midwest university completed the PSMs. They came from two teacher education programs: grades K-5 or grades 4-9. PSMs 3-8 were completed in their program's first-year and again in the fourth-year. The intended use for the PSMs was formative and for program evaluation. They were informed that results did not impact course grades. Content and consequences data were gathered from mathematics content and mathematics education instructors. Qualitative data were analyzed using thematic analysis (Miles et al., 2016). Quantitative data were analyzed with WINSTEPS© (Linacre, 2019).

Findings & Discussion

Content experts felt items were appropriate for use with PSTs and connected with content from their classes. PSMs 3-8 fit the Rasch model indicating good psychometric quality. Finally, thematic analysis of consequences data indicated that the PSMs felt no different than a unit test and offered formative data to adapt instruction. Collectively, these findings help to inform the potential uses of the PSMs, a student measure, for use with a related population, PSTs.

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References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing.* Washington, DC: AERA.

Bostic, J., Sondergeld, T, Matney, G., Stone, G., & Hicks, T. (2021). Gathering response process data for a problem-solving measure through whole-class think alouds. *Applied Measurement in Education, 34*(1), 46-60. *DOI: 10.1080.08957347.2020.1835913*

Bostic, J., Sondergeld, T., Folger, T. & Kruse, L. (2017). PSM7 and PSM8: Validating two problem-solving measures. *Journal of Applied Measurement, 18*(2), 151-162.

Bostic, J., & Sondergeld, T. (2015). Measuring sixth-grade students' problem solving: Validating an instrument addressing the mathematics Common Core. *School Science and Mathematics Journal, 115, 281-291*.

Common Core State Standards Initiative. (2010). Common core standards for mathematics. http://www.corestandards.org/Math/

Miles, M., Huberman, A.M., Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd Ed.), SAGE Publications.

Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests* (expanded ed.). Chicago, IL: University of Chicago Press.

Linacre, J. M. (2019). *WINSTEPS*® (Version 4.4.5) [Computer software]. Beaverton, Oregon. https://www.winsteps.com/winsteps.htm