SCHOOL SCIENCE AND MATHEMATICS

Research to Practice Article
The Professional Needs of Elementary Teachers Implementing the Common Core State Standards for Mathematics

Based on the published SSM Journal Research Manuscript: Transitioning to the Common Core State Standards for mathematics: A mixed methods study of elementary teachers' experiences and perspectives

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Overview

This mixed methods study involved 73 teachers at a large, urban elementary school in the southeastern U.S. Many were novice teachers, with 40% reporting 5 years or less of teaching experience; 68% of the teachers had at least a Master's degree. For the student population, 95% were eligible for free or reduced lunch, the majority were Hispanic (69%), and 55% participated in the English as a Second Language (ESL) program. At the time of data collection, the teachers were mid-way into their second year of implementation of the Common Core State Standards for Mathematics (CCSS-M). All teachers completed a 22-item survey focused on their experiences with and perspectives on the CCSS-M, as well as an 8-item open-ended questionnaire designed to illuminate the survey items. Six randomly selected teachers participated in interviews.

Research Topic

Teachers in 43 states are now expected to utilize the academic standards of the CCSS-M (CCSS, 2015) with the aim of improving mathematics teaching and learning across the U.S. The CCSS-M represent a major overhaul of most states' previous standards and are intended to provide a more coherent, rigorous, and focused mathematics curriculum for students. Whether or not students learn the CCSS-M depends on teachers' instructional expertise, with the standards potentially requiring increased *specialized content knowledge* (SCK) and fundamental changes in instructional practices of teachers (Schmidt, 2012). In fact, many contend CCSS-M implementation will necessitate a significant revamping of mathematics education in schools, including extensive professional development and adoption of new curricula (Cobb & Jackson, 2011; Lee, 2011; Schmidt & Houang, 2012). A core challenge for transitioning to the CCSS-M lies in putting the standards into classroom practice, with teachers as major forces on how this plays out (Dacey & Polly, 2012). Accordingly, a close study of teacher perspectives is warranted, particularly in light of the scant research on and widespread adoption of this national-scale reform. This inquiry was guided by these questions: 1) What are elementary teachers' familiarity with and preparation for teaching the CCSS-M? 2) What are elementary teachers' views on integration of the CCSS-M into their classroom teaching practices? and 3) What tensions do elementary teachers' identify with implementation of the CCSS-M?

Major Findings and Discussion

The teachers held decidedly positive views on the standards, with 78% strongly agreeing/agreeing (SA/A) they are a constructive step for mathematics education in the U.S. If the intent of the CCSS-M is actualized, for the first time students across the U.S. in grades K-8 will have generally been taught the same content (Schmidt & Burroughs, 2013). It has been argued this common content will help address two persisting problems in the U.S.: middling quality of mathematics learning and unequal opportunity across schools.

The teachers' optimism was not limited to the national scale, with 83% SA/A the standards improve their own teaching and 78% SA/A the standards benefit their own students' learning, with the latter linked to the

emphasis on mathematics as a sense-making activity. Such a hopeful view can go a long way with adequate teacher preparation and aligned curricular resources, of which teachers in this study needed more (e.g., 25% had received no professional development on the CCSS-M). Though the teachers called for more professional learning, they generally held a degree of familiarity with the new standards, with 63% recognizing the standards as different from their previous ones. Others have argued this not to be the case and therefore a challenge for CCSS-M implementation, as a number of teachers believe the new standards are the same as their preceding ones (Schmidt & Houang, 2012). Fortunately, this was not the perspective of the teachers in this study.

The teachers recognized the CCSS-M require them to change their classroom teaching practices, with 70% SA/A with this item, and several constraints related to implementation were identified. As suggested in the literature (Schmidt, 2012), the need for improved content knowledge, particularly SCK, was a barrier for enactment. The teachers struggled to understand, interpret, and respond to children's thinking and invented solution strategies. In addition, the teachers had significant concerns about teaching certain groups of students the standards and felt least prepared to teach students with mathematics disabilities. The teachers also voiced apprehension about a mismatch of the standards with the needs of ELLs, whom are prevalent at this school. Further, lack of student readiness was a concern, linked with gaps in skills and knowledge grounded in students' past experiences as learners of mathematics. For example, student explanation of their mathematical thinking and reasoning was one noted challenge.

Implications for Practice and Similar Research

The CCSS-M have much to offer, and now is the time to provide teachers crucial support to assure success of the standards. Certainly, aligned curricular resources and relevant professional development are vital, and these teachers suggested observations of enacted CCSS-M aligned lessons, understanding differences between CCSS-M aligned lessons and those not aligned, and time spent unpacking the standards as particularly useful. In addition, professional learning should focus on: building mathematical knowledge for teaching; developing abilities to interpret, analyze, and respond to children's thinking; learning ways of facilitating productive classroom discourse in mathematics; and addressing the needs of a variety of learners via the CCSS-M, including students with mathematics disabilities and ELLs.

Understanding and interpreting students' mathematical thinking and ideas, a key component of SCK, should be a central component of professional learning focused on the CCSS-M. When teachers encounter an unanticipated response or thinking strategy from students, they must make an immediate decision about its soundness and significance and choose their response accordingly. The true success of CCSS-M implementation will be determined in the myriad minute-by-minute choices that teachers make during instruction to capitalize on teachable moments in ways that support students' mathematical understanding and reasoning (Griffin & Ward, 2014). Professional development should prepare teachers for this continuous act of decision-making in a way that is responsive to and builds upon children's thinking and understandings (Philipp, 2008).

Teaching the content-rich standards to students with mathematics disabilities can be daunting as these students often lack the most basic mathematics skills (Mulcahy, Maccini, Wright, & Miller, 2014; Powell, Fuchs, & Fuchs, 2013; Saunders, Bethune, Spooner, & Browder, 2013). It has been proposed that these students should learn skills aligned with their grade level content in the CCSS-M, while continuing to work on foundational skills such as knowledge of numbers, counting, number combinations, and operations needed to complete many mathematics problems.

A mismatch of the CCSS-M with the needs of ELLs was a perceived dilemma by the teachers. However, others assert that the CCSS-M affords opportunities for language development, that is ELLs can produce mathematical explanations and presentations and participate in classroom discourse as they are learning English. Specifically, mathematics instruction for ELLs should treat language as a resource and not a deficit and also draw from multiple representations (e.g., objects and drawings), experiences outside of school, and home languages (Moschkovich, 2012). Regular and active participation—not only reading and listening but also discussing, explaining, writing, representing, and presenting as they learn English—is critical to the success of ELLs in mathematics (CCSS, 2015).

For reference, two studies with a similar focus as this one include:

McDuffie, A R., Drake, C., Choppin, J., Davis J. D., Magana, M. V., & Carson, C. (2015). Middle school

mathematics teachers' perceptions of the Common Core State Standards for Mathematics and related assessment and teacher evaluation systems. *Educational Policy*, 1-41.

Editorial Projects in Education Research Center. (2013). Findings from a national survey of teacher perspectives of the common core. EdWeek. 1. Retreived from http://www.edweek.org/rc

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Common Core State Standards, (2010; 2015). Common Core Standards Initiative. Retrieved from http://www.corestandards.org/

Dacey, L. & Polly, D. (2012). CCSSM: The Big Picture. *Teaching Children Mathematics, 18,* pp. 378-383.

Griffin, L., & Ward, D. (2014). Teachable moments in math. (Dec. 2014/Jan. 2015). *Educational Leadership,* 34-40.

Lee, J. O. (2011). Reach teachers now to ensure common core success. *Kappan, 92*(6), 42-44.

Moschkovich, J. (2012). Mathematics, the common core, and language: Recommendations for math instruction for ELs aligned with the common core. *Understanding Language,* 17-31.

Mulcahy, C. A., Maccini, P., Wright, K., & Miller, J. (2014). An examination of intervention research with secondary students with EBD in light of common core state standards for mathematics. *Behavioral Disorders, 39*(3), 146-164.

Philipp, R. A. (2008). Motivating prospective elementary school teachers to learn mathematics by focusing on children's thinking. *Issues in Teacher Education, 17(*2), 7-16.

Powell, S. R., Fuchs, S. L., & Fuchs, D. (2013). Reaching the mountaintop: Addressing the common core standards in mathematics for students with mathematical disabilities. *Learning Disabilities Research and Practice, 28,* 28-48.

Saunders, A. F., Bethune, K. S., Spooner, F., Browder, D. (2013). Solving the common core equation. *Teaching Exceptional Children, 45*(3), 24-33.

Schmidt, W. H. (2012). At the precipice: The story of mathematics education in the United States. *Peabody Journal of Education, 87*, 133-156. doi:10.1080/0161956X.2012.642280

Schmidt, W. H., & Burroughs, N. A. (2013). The common core state standards address two tenacious problems in U.S. education. *Educational Leadership,* 54-58.

Schmidt, W. H., & Houang, R. T. (2012). Curricular coherence and the Common Core State Standards for Mathematics. *Educational Researcher, 41,* 294-308.