Teaching and Learning the Common Core State Standards in Mathematics with Web 2.0 Tools

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EXECUTIVE SUMMARY

With the initial implementation of the Common Core State Standards in Mathematics (CCSSM) currently under way across much of the United States and the continuing evolution and expansion of educational technology, it is imperative that teachers not only understand the new Common Core content expectations but also know how to incorporate the Common Core Standards for Mathematical Practice using technological tools. As teacher educators of pre-service and in-service K-12 teachers, the authors have developed and utilized a variety of methods to introduce the CCSSM and technology tools to our students. Among these methods are a heavy emphasis on mathematical problem solving and the use of Web 2.0 tools, both by us and our students, to illustrate mathematical concepts, promote exploration, and assess understanding. Asking pre-service and in-service teachers to produce their own CCSSM-aligned Web 2.0 creations is an effective way to teach the new standards while introducing them to the latest technological tools. With technology becoming ever more vital in the teaching and learning of mathematics, it is essential that teach-

ers develop expertise in promoting the CCSSM with the latest technological tools.

ORGANIZATION BACKGROUND

The authors teach at the Atlanta, Georgia (USA) campus of Mercer University. Their students are primarily preservice and inservice teachers in Master of Arts in Teaching (MAT) and Master of Education (M.Ed.) degree programs. The methods and ideas presented in this chapter have been implemented in the authors' own classrooms.

SETTING THE STAGE

Released in 2010 by the Common Core Sate Standards Initiative (CCSSI), the CCSSM have been adopted by the majority of states and are expected to be fully implemented by 2014 (Wu, 2011). As such, teacher education programs must provide training in the new standards immediately, especially in the states that have already adopted the standards. Otherwise, new mathematics teachers will enter the profession with little to no exposure or understanding of the standards that they will be expected to teach.

Similarly, new teachers are expected to be proficient with educational technology and incorporate these tools into their teaching. Because technology has been shown to increase student achievement in mathematics (International Society for Technology in Education [ISTE], 2008), it holds an important role in mathematics education. The National Council of Teachers of Mathematics (NCTM, 2000) has put forth the Technology Principle which states: "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (p. 24). Similarly, the Apple Classrooms of Tomorrow – Today (ACOT[2]) model emphasizes the ubiquitous use of technology (Apple, 2008), while ISTE (2008) states that "technology must be incorporated into the daily learning schedule" (p. 7). Such conditions must be met "in order to positively affect student achievement and to enhance 21st century skills" (ISTE, 2008, p. 7).

Although the CCSSM content standards do not explicitly mention educational technology requirements (Porter, McMaken, Hwang, & Yang, 2011), the Common Core Standards for Mathematical Practice do include technology. Students are expected to be able to use technological tools properly when doing mathematics. For example, the standard "CCSS.Math.Practice.MP5: Use appropriate tools strategically" requires students to be "able to use technological tools to explore and deepen

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