Using New Technologies to Engage and Support English Language Learners in Mathematics Classrooms

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EXECUTIVE SUMMARY

An emerging body of research is demonstrating the potential of new technologies such as iPad and phone apps, wikis, blogs, podcasts and web-based editing tools for significantly improving the academic language development of English language learners. The authors of this chapter present an expanded definition of academic language, explain why these new technologies are important, and discuss how they can be used to provide effective and innovative mathematics instruction to English language learners. Three classroom vignettes demonstrate specific ways in which a variety of technologies can be implemented across grade levels to meet the Common Core State Standards for Mathematical Practice and Content.

INTRODUCTION

An emerging body of research is demonstrating the potential of new technologies such as iPad and phone apps, wikis, blogs, podcasts and web-based editing tools for significantly improving the academic language and disciplinary learning of English language learners (ELLs). In this chapter we present an expanded definition of academic language, explain why these new technologies are important, and discuss how they can be used to provide effective and innovative mathematics instruction to ELLs. We also present a set of frames that articulate high leverage practices for differentiating instruction to meet the needs of ELLs, as well as classroom vignettes that demonstrate specific ways in which a variety of technologies can be implemented to meet the challenges of the Common Core State Standards in Mathematics (CCSS-M).

THE CHALLENGES OF THE COMMON CORE STATE STANDARDS IN MATHEMATICS

Academic language and literacy play a critical role in the new CCSS. A set of papers commissioned by the Understanding Language Initiative at Stanford University stresses the challenges and language demands that the new standards place on ELLs and their teachers (Bunch, Kibler & Pimentel, 2012; Moschkovich, 2012; Quinn, Oklee, & Valdes, 2012; Van Lier & Walqui, 2012; Wong Filmore & Filmore, 2012). These scholars suggest that the CCSS have added an exciting and challenging layer to the schooling of ELLs. The exciting part is that many of the CCSS will require a focus on robust development of disciplinary thinking and communication skills, which better prepare all students for success in college. In math this means students will need to use and explain connections between representations, share and refine their reasoning, and develop meaning for symbols. The challenging part is that meeting these new standards requires higher levels of receptive and productive academic language.

For ELLs in particular, the development of academic language is one of the most important factors in their academic success and has been increasingly cited as a major contributor to gaps in achievement between ELLs and native speakers of English (Anstrom et al., 2010; Francis, Rivera, Lesauz, Kieffer, & Rivera, 2006).

Proficient use of - and control over - academic language in English is the key to content area learning in our schools. Given the nature of today's academic demands, lack of proficiency in academic language affects students' ability to comprehend and analyze texts, limits their ability to write and express themselves effectively,