Chapter 19
The iPad:
A Mathematics Classroom Tool for Implementing the Common Core State Standards Technology Vision

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ABSTRACT

This chapter discusses the technology vision of the Common Core State Standards (CCSS) and shares guidelines for choosing apps that are most appropriate to meet those objectives. Towards this end, a specific rubric for evaluating the effectiveness of different apps is presented. Advantages of existing apps that can be incorporated into iPad instruction to enhance conceptual learning and drill mathematics processes are reviewed. Common disadvantages of existing apps are also highlighted. Specific examples of how to make the use of the iPad most efficient and avoid common pitfalls of some purported learning tools are also discussed. The chapter concludes with areas still in need of further research.

In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their future. Mathematical competence opens doors to productive futures. A lack of mathematical competence keeps those doors closed…. All students should have the opportunity and the support necessary to learn significant mathematics with depth and understanding. NCTM (2000, p. 50)

DOI: 10.4018/978-1-5225-3832-5.ch019

INTRODUCTION

Technology is essential to mathematics curricula, influencing the mathematics taught and enhancing students' learning (NCTM 2000, p. 24). The technology-enabled learning setting is an educational environment supported by mathematical technologies, communicative and collaborative tools, or a combination of both (Arbaugh, et al., 2010). In this chapter, mathematical technologies refer specifically to digital content accessed via handheld tablet devices and the apps they support. The Common Core State Standards' Standards for Mathematical Practice promotes the strategic use of appropriate tools and technology, which include digital applications, content, and resources (CCSSO, 2010). The advent of iPads in a mathematics classroom marks an avenue for this advancement.

For more than two decades mathematics education has been undergoing changes. In 2010, the Council of Chief State School Officers (CCSSO) presented the latest document for reform in mathematics education. This document has had an enormous impact on school mathematics. It articulates a vision of learning and the habits of mind expected of all students. Central to the document's position is the infusion of technology through The Standards for Mathematical Practice. The use of technology should not be regarded as a separate content or strand in mathematics curriculum; it should be a main component of the instructional arsenal of tools for deepening student understanding of learning and teaching. Emerging technologies, like the iPad, can enlarge the scope of content students can learn and broaden the range of problems that students are able to tackle (Ball &Stacey, 2005; NCTM 2008b) but technology alone cannot be a replacement for the full conceptual understanding of mathematics content. Learning mathematics is maximized when teachers employ technology to focus on mathematical thinking and reasoning (NCTM 2009, n.d.). Ultimately, it is the teacher who will shape mathematics for the students they teach. The teacher's beliefs about what mathematics means to them and about how students make sense of mathematics will affect how they approach instruction. Among the necessary components needed to change the mathematics classroom and implement the vision of CCSS are expectations that teachers create an environment that offers all students an equal opportunity. This process likely requires differentiated instruction that balances conceptual understanding with procedural fluency. This shift is necessary to ensure active student engagement and promote technology-supported learning activities that include appropriate choices of available apps to facilitate the implementation of the lessons.

Preparing mathematics teachers for achieving these goals with technology-equipped classrooms in the 21st century is a complex task. It is important that teachers develop a model of teaching and learning that goes beyond the specifics of a single technological tool so that they are able to make informed decisions about the appropriate use of technology. Teachers today must learn challenging content and specialized pedagogies to successfully implement the 2010 adopted Mathematic Standards. For many teachers, the tablet is a new and unfamiliar instructional tool, and they must acquire sophisticated strategies for instruction that require the use of the tablets as a tool. The proper selection of appropriate apps is of the foremost importance to successful implementation of the tablet as a learning device. The app must not only cover the mathematics content and drills but the conceptual component of that content to promote successful learning.

The mandates of CCSSM have made it necessary to integrate technology into the curriculum. Thus, in more and more schools today, technology is recognized as an instructional tool, *not* as a subject of instruction. Still, many educators, less familiar and less comfortable with technology than their students, struggle to seamlessly integrate a growing list of technology tools into their regular class curricula. So,