Teaching Fundamental Math Concepts:
There's an App for That ... Or is There?

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EXECUTIVE SUMMARY

The use of mobile devices such as iPads to improve mathematics teaching and learning is on the rise. Parents are using them to informally teach their children (Franklin, 2011), teachers are using them for drill and practice (Murray & Olcese, 2011), and even politicians and administrators are pushing for more use of mobile technologies in classrooms (Murray & Olcese, 2011). With the increased prominence of iPads in the classroom—by 2013 Apple had sold 8 million iPads directly to educational institutions (Etherington, 2013)—the need for well-designed apps has never been greater. In this chapter, the authors explore what makes a good app, what to do when you cannot find the app that you need, and discuss how to successfully deploy apps in the elementary school classroom.

OUR STORY

We were curious about the use of iPads in a local school, specifically, how apps were being used to teach mathematics content. We began our investigation by requesting to work with a third grade teacher to see just how apps were being used. The school had a set of iPads the teachers could check-out when desired. This particular teacher used the iPads in various subjects, including mathematics. We checked out one of the iPads and searched through the extensive list of apps on it to find ones that taught (or purported to teach) mathematical content. There were plenty of quality apps, but nary a one was suitable to *teach* Common Core State Standards (CCSS) content: these apps were designed strictly to *reinforce* skills. This finding is not unique to this one iPad in this one classroom; Murray and Olcese (2011) noted that many apps are often developed and used solely for drill and practice without taking into consideration constructivist learning theories. Additionally, because the majority of in-service teachers were not previously taught how to integrate iPads into the classroom, the iPads were not used in an optimal fashion, i.e., to develop deeper mathematical content knowledge (Wachira, et.al., 2008). Considering recent trends to encourage thinking, reflection, and broadened conceptual understanding in elementary mathematics curriculum with CCSS, the lack of mathematical apps to enhance effective classroom instruction seems particularly galling.

Since teaching mathematics content with apps is a laudable goal, we set out to develop an app that would do just that. We chose multiplication (and related concepts) because this is the first critical area mentioned in the third grade CCSS.

The teacher decided that the app should address specific learning goals that would help students develop the following understanding:

1. Products of whole numbers can be interpreted as a specified number of equal groups (CCSS.MATH.3.OA.A.1);
2. The equal groups can be arranged into an array;
3. Repeated addition and skip counting allow us to more quickly determine the total number of objects in equal groups or the associated array (CCSS.MATH.2.OA.C.4);
4. One of the factors can be split up into addends allowing us to multiply each addend by the other factor and adding the sums together, or the distributive property, and this allows us to find some products more easily (CCSS.MATH.3.OA.B.5);
5. The relationships between and among the area of a rectangle, an array, repeated addition and multiplication (CCSS.MATH.3.MD.C.7).