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Title of chapter/article	Teaching with Technology: Mathematics on the Move: Using Mobile Technologies to Support Student Learning (Part 1)
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explore the use of mobile technologies as part of our digital repertoire for teaching mathematics. If you are thinking mobile technologies means calculators then this article will provide food for thought! Watch out for part 2 next year.

Mathematics on the move: Using mobile technologies to support student learning (Part 1)

Continuing our series of articles on teaching mathematics with technology, this edition is an exploration of the use of a range of mobile technologies to enhance teachers' practices in the primary mathematics classroom. In Part 1 of this article we will explore the use of the iPod Touch and iPad. In Part 2, we explore GPS devices and a range of other hand-held devices.

It is a common belief that the incorporation of computer technology into mathematics teaching and learning motivates and engages students (Pierce & Ball, 2009). However, research into the use of ICTs (Information and Communication Technologies) in mathematics classrooms has revealed some issues that could negatively impact on student engagement as a result of how they integrate with existing practices. There is a danger of the technology driving pedagogy, rather than pedagogy driving the technology. In other words, technology sometimes becomes the focus of the mathematics lessons instead of the mathematics itself. Research by Samuelsson (2007) revealed some teachers who regularly incorporate computers into their lessons tend to use them in a way that resonates with

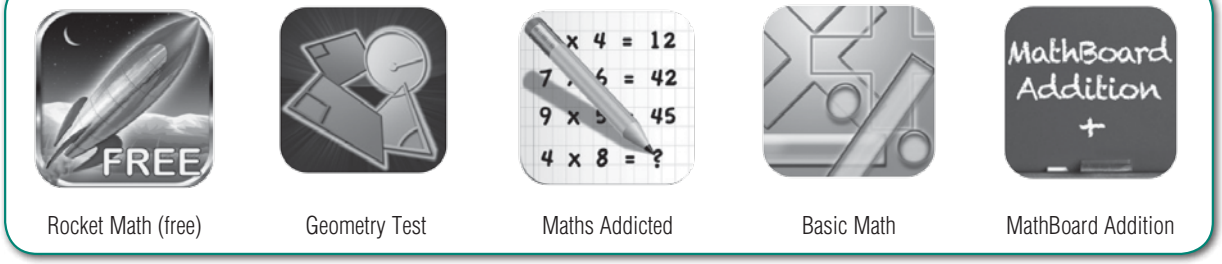

Figure 1. Fluency builders.

a didactical, teacher-centred approach. In this situation such an approach restricts the potential of ICTs to act as an agent of change in terms of supporting students' engagement with the subject.

When good pedagogy drives the incorporation of technology into mathematics teaching and learning, ICTs have immense potential to enhance students' experiences with mathematics. The following sections provide a brief overview of how some of the more modern, mobile technologies can be used in the primary mathematics classroom.

iPads and iPods

For many teachers and students, the idea of using the iPod Touch and iPad for learning immediately suggests the use of mathematics focussed applications, or 'apps', that more often than not focus on drill and practice through games. Although the use of mathematics apps can be engaging and of benefit to students in terms of building fluency and increasing motivation through their sometimes competitive nature, mobile technologies offer much more in terms of allowing students access to a broad range of tools that have the potential to enhance teaching practices, student engagement, and student learning.

There are literally thousands of mathematics based apps available either free or for a small price so it is important that teachers test the apps to ensure they are appropriate for our curriculum and specific student needs. Figure 1 above highlights five examples of apps available for the iPod Touch and/or iPad that can be used to increase fluency in number operations and to some degree, mathematical reasoning.

The first, Rocket Math, would be the most engaging app in this group as it has a 'game-like' feel to it, requiring students to build a rocket with money earned through answering number sentences based on the four operations. Once the rocket is built, the player can embark on a mission that also embeds mathematical questions at varying levels of difficulty. The other apps listed above can be useful for having students practice computation, but offer little more than a text-book or worksheet in terms of their potential to increase student engagement and motivation.

The examples of apps in Figure 2 below, support a problem-solving and investigative approach to learning mathematics.

Figure 2. Puzzles and problem solving.

The first app, Red Dragonfly Mathematics Challenge, presents a set of challenging problems that could easily lead to very rich mathematical investigations. The drawback with this app is that it is based on a book, and lacks an interactive element, purely presenting the problems as they would appear on paper. The remaining examples of problem solving, puzzle-based apps are more interactive and, provided there was an added requirement for either verbal or written reflection on the mathematics involved in the tasks, they provide opportunities to address the proficiency strands of the Australian Curriculum.

The next group of examples, in Figure 3 below, are apps that provide the best opportunities for allowing the 'pedagogy to drive the technology' and can be viewed as tools that support learning and teaching. They are not all specifically mathematics based, yet provide the means to support students during mathematical investigations.

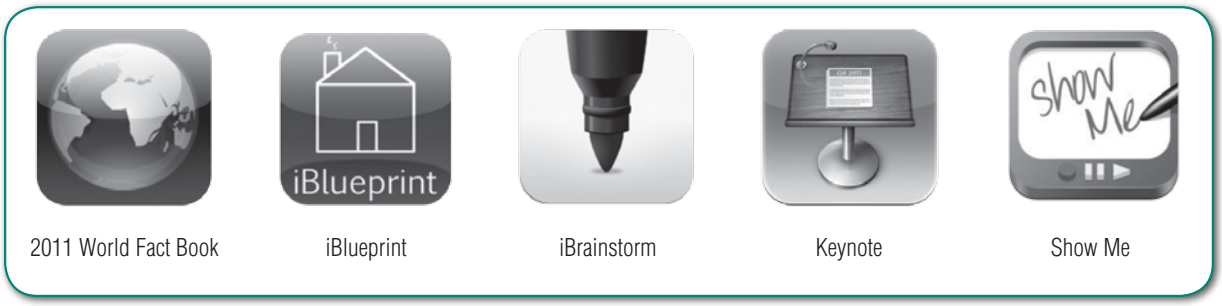

Figure 3. Tools for learning.

The first app, World Fact Book, provides up-to-date information on every country providing opportunities for students to make comparisons in terms of the statistical information provided. The next app, iBlueprint, allows students to create blueprints of floor plans which would be ideal when working on activities that focus on position, scale, area and perimeter. iBrainstorm is a brainstorming tool that allows a group of students to brainstorm simultaneously (Internet access is required). Keynote is a tool that creates very professional looking slide presentations without having to access a computer. Students could use this app to create presentations of their work. The final app is a tool that is of benefit to teachers and students. Show Me allows students to record their voices while they draw. Imagine asking a student to show and explain how they work out a computation! The evidence gathered can be used to assess mathematical content and mathematical processes because you are able to capture the student's verbal reasoning and problem solving skills.

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