Chapter XII

Is Learning as Effective When Studying Using a Mobile Device Compared to Other Methods?

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**Abstract**

A concern with E-Learning environments is whether students achieve superior or equivalent learning outcomes to those obtained through traditional methods. In this chapter the authors present the results of a research study comparing students’ learning outcomes with four different delivery methods - printed study material, lecture format, computers and “smart” mobile phones. The results of our study show that learning outcomes are similar when students study by using a computer, mobile phone, or lecture format, while studying with print material yields slightly superior test results. These findings are discussed in the context of the type of learning used in the study and the factors that impact on the effectiveness of using mobile phones for learning purposes, such as learning styles and attitudes to computers. The authors conclude the chapter by briefly discussing developments in mobile technologies and the opportunities they present for mobile learning.

**Introduction**

Contemporary learning environments in higher education are increasingly characterised by the use of E-Learning opportunities designed to support and extend students’ learning experiences. Recently a shift has occurred in the use of information technology to support education such that educational content and learning opportunities are now being made accessible to a mobile device...
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(e.g., laptop, personal digital assistant (PDA), iPod, mp3Player or mobile phone), over a wireless network (Hoppe, Joiner, Milrad, & Sharples, 2003; Leung & Chan, 2003; Chen, Chang & Wang, 2006). Mobile learning or m-learning is the term that has been coined to describe learning using a mobile device and its attraction is that content can be accessed from any location at any point in time with a device that is small, lightweight and easy to carry. Preliminary evidence indicates that m-learning provides a number of opportunities to support traditional and new forms of learning, although there are significant concerns around screen size, device memory and access costs that need to be managed carefully (Chen et al., 2006). There is also concern amongst teachers as to whether students can achieve equivalent or superior learning outcomes from online learning environments generally, and particularly with mobile devices given their compact nature. In this chapter we examine whether learning using a mobile device is as effective as other learning methods in order to establish its efficacy as a viable technology tool to enhance teaching and learning. We report the results of a controlled study comparing the learning outcomes students achieve when studying material using four delivery methods and discuss the implications of our finding that students learn just as well when material is delivered using a mobile phone compared to a computer or lecture-format. Although the type of learning assessed in our study is limited to recall and recognition learning, our study shows that mobile phones can be an effective learning tool. We discuss the implications of our findings broadly and we present other learning and assessment opportunities mobile phones can be used for, both now and in the future.

BACKGROUND

Most students have a mobile phone or access to one. It was estimated in 2003, that there were over 300 million world-wide users of mobile phones (Leung & Chan 2003). However, a report from the International Telecommunications Union in 2008 estimated there are 3.3 billion users (ITU, 2009). Many also have iPods and mp3Players; ready access to which makes these devices ideal as a mobile learning tool (Stockwell, 2007). In 2006 the Technology Advancement Centre at East Carolina University conducted a survey to assess the mobile needs of distance education and campus learners. Of the 4,000 students who responded to the survey 94% owned cell (mobile) phones and the preferred communication device carried by campus students was a mobile phone (DuVall, Powell & Lucier, 2006). There are several advantages to using a mobile learning device. First, mobile devices are more portable because of their small size and when combined with access to wireless networks, educational activities can occur in locations beyond the classroom, embedding the learning situation within a real-life context that can enhance the relevance of the learning situation for students (Chen, Kao, & Sheu, 2003; Liu, Tao & Nee, 2007; Motiwalla, 2005). Mobile learning can also promote immediacy of learning by allowing learning to operate in real time (any time), so that students can access information as urgently as required (Fallahkhair, Pemberton, & Griffiths, 2007; Triantafillou, Georgiadou, & Economidou, 2006). With a mobile learning device, students no longer need to record a question and later refer to a textbook or wait for an opportunity to access information online (Chen et al., 2003; Leung & Chan, 2003; Liu et al., 2003).

Although mobile phones are cheaper and more portable than personal computers (PCs), at present, there are several technical limitations preventing small mobile learning devices from replacing the PC as the principle E-Learning device. With many mobile devices, the screen size limits the amount of information that can be displayed (Shudong & Higgins, 2005). Small font is hard to read and larger text presents the inconvenience of continually scrolling down