Analyzing the Effects of Context-Aware Mobile Design Principles on Student Learning

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ABSTRACT

The adoption of mobile technology is rapidly transforming how individuals obtain information. Learning occurs when content is accessed in a recursive process of awareness, exploration, reflection and resolution within one’s social context. Specifically, the most visible, current definitions of mobile learning provide an overview of the learning theory and device characteristics informing mobility, but do not focus on how people interact with mobile devices in their everyday lives. The purpose of this study was to test the effects of context-aware mobile design principles on student learning. The study had 60 participants randomly assigned to treatment and control conditions. The results indicated that the treatment group scored a significantly higher mean score than the control. The data suggests that mobile learning is more than just an extension or luggable form of electronic learning. It requires a designer to understand instructional and software design, mobile human-computer interactions, and learning theory.

Keywords: M-Learning, Mobile, Mobile HCI, Mobile Human-Computer Interactions, Mobile Learning

INTRODUCTION

Learning occurs when content is accessed in a recursive process of awareness, exploration, reflection and resolution within one’s social context. In recent years, the adoption of smartphone technology in American society has been rapid and increasing. During a four year period from 2007 through 2011, smartphone ownership in America has grown from zero to 35% (Smith, 2011). Smartphone users report that these devices are the gateway for informing their daily lives (Palfrey & Gasser, 2008) and the usage patterns for smartphones are significantly different than that of a personal computer (Dean, 2011). Google (2012) also reported that 80% of respondents never leave their homes without their smartphone and use the device in many different settings including restaurants, doctor’s offices, coffee shops, and just on-the-go. The device acts as a multi-activity portal for communication, education, information gathering and entertainment. Users today are characterized by their heavy use of mobile technologies, their tendencies to multitask, their tendency to express themselves through the use of social

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media and their patterns of using technology to access and use information to create knowledge and art (Palfrey & Gasser, 2008).

Along with the smartphone came the ability to download apps that can do just about any type of information retrieval. Bowen (2012) defines apps as highly customized slivers of the Internet. Over the past few years, our appetite for apps has continued to grow. According to Pew Research, nearly half of all Americans, 46%, have downloaded and installed apps on their cellular phones; a figure up by 24% from 2009 (Purcell, 2011). In 2011, the average Apple iPhone user owned 108 apps and used them for 84 minutes a day (Hodgkins, 2011). Current statistics indicate that the amount of time one uses apps has grown to 94 minutes a day; outpacing that of mobile Web browser consumption (Khan, 2011; Newark-French, 2012). Increasingly people are turning to mobile apps, downloaded for very specific purposes, and using these apps for information acquisition (Elias, 2011). As Hodgkins (2011) points out, the abundance of apps and the small amount of time people use them presents a small window of opportunity for instruction to be delivered in relevant and meaningful ways.

The average user today spends 9% more time using mobile apps than Web-based consumption (Khan, 2011). Given this transition to apps, relevant consideration of mobile user context and user interface design should become a fundamental aspect of any mobile learning (m-Learning) design. If an interface design does not fit a mobile usage pattern then the mobile activity could be a hindrance to learning. Designing learning activities, given the different characteristics of learners and devices, presents significant challenges for educators (Botha, Greunen, & Herselman, 2010). How people interact with mobile devices is as important as the content or learning theory, but much of what is known about m-Learning focuses on pedagogy and not user-device interactions (Botha et al., 2010). Botha et al. (2010) states that human-computer interaction, HCI, is an academic discipline that studies design practices and tools that are used in situations involving people and technology. A subset of that field is Mobile HCI, applying HCI research to situations involving people and mobile technology. The field investigates the ways people interact with mobile devices and the data that is acquired. They assert that the relationship between m-Learning and Mobile HCI is interwoven and dependent. The pedagogical requirements of mobile learning drives the affordances of Mobile HCI design, but one is not dominant over the other.

m-Learning is a new field of educational research with its own set of pedagogical concerns (Botha et al., 2010; Parsons & Ryu, 2006; Traxler, 2007; Traxler & Kukulska-Hulme, 2005). m-Learning has been defined as any educational provision where the sole or dominant technologies are handheld (Traxler, 2005). All current descriptions of m-Learning defined the phenomenon via the device’s characteristics or learning theory. However, a review of the literature reveals there is no firm consensus amongst m-Learning researchers of what constitutes a successful m-Learning environment (Najmi & Lee, 2009; Traxler, 2007; Traxler & Kukulska-Hulme, 2005) and very few studies look to the field of Mobile HCI for guidance on user context. Much of what we know about m-Learning comes primarily from the domain of education; and educational researchers dominate this new field. The various definitions of m-Learning present difficulties for conducting research and although these mobile technologies have been incorporated into the field of education, there has only been cursory exploration of how mobile human-computer interactions effect student learning (Laouris & Eteokleous, 2005). Specifically, the most visible, current definitions of and current research in m-Learning provide overviews of the learning theory informing mobility and focus on device characteristics, but do not focus on how people interact with mobile devices in learning environments (Parsons & Ryu, 2006; Traxler, 2007; Traxler & Kukulska-Hulme, 2005). Mobile HCI research focuses on how people interact with mobile devices in their everyday life. Studying those usage patterns in learning environments is an
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