How Biomedical Science Students Use Their Mobile Devices for Learning

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ABSTRACT

Learning occurs in many forms, and learning through mobile devices is becoming increasingly common in higher education. Potentially, there are many ways students may implement mobile learning to enhance learning, and this may be influenced by students’ confidence and preferences. To identify mobile learning behaviours, biomedical students (n=189) were asked in meta-learning assessment tasks to report on self-initiated ways they used mobile devices for learning. Thematic analysis of responses showed students were confident using mobile devices for learning, but students of all confidence levels had similar usage levels. Students most commonly reported using laptops for note-taking, watching lecture recordings, and planning, and using phones for looking up concepts and using applications. This contributed to their self-regulation primarily by aiding students’ keeping of records and information seeking behaviors. Students also implemented many new ways of using devices during semester, demonstrating adaptability. Surprisingly, they rarely reported seeking social assistance via mobile devices.

KEYWORDS

Adaptability, Biomedical Science, Metacognition of Learning, Mobile Devices, Mobile Learning, Self-Efficacy, Self-Regulated Learning, Technology Acceptance Model, Undergraduate

INTRODUCTION

Learning occurs in many forms, and learning through handheld mobile devices is becoming increasingly common in higher education (El-Hussein & Cronje, 2010). Mobile learning creates a greater degree of flexibility for the learner as it allows a seamless and ‘anywhere-anytime’ learning experience (Ernst, Harrison, & Griffin, 2013; Mockus, Dawson, Edel-Malizia, Shaffer, An, & Swaggerty 2011). Potentially, there are many alternate ways in which students may implement mobile learning to enhance their learning experiences. However, exactly how students utilise their mobile devices to assist their self-regulated learning formally and informally, the factors which influence the choices regarding mobile device use, and the impact these have on academic achievement remain unclear. Given the increasing focus on utilising mobile devices for course content delivery, identifying why students may or may not adopt mobile technologies and their preferences regarding mobile device use will provide insights that may aid the design of more effective curricula.
BACKGROUND

In an educational environment, mobile devices are those which facilitate ubiquitous learning, including mobile phones, tablets and laptops (Wallace, Clark, & White, 2012). The earlier definitions of mobile devices did not include laptops (Shearer, 2010), but in recent years laptops have transformed from bulky, heavy devices to sleek, light and highly portable computing devices (Jeng, Wu, Huang, Tan, & Yang, 2010; Motiwalla, 2007). For example, laptops such as the Macbook Air™ (Apple Corporation, CA, USA), which are very commonly used by students, weigh less than 1.5kgs. Modern laptops have an advantage over tablets, being only slightly heavier but having vastly greater functionality.

The popularity of mobile handheld devices has increased dramatically in recent years, with device penetration now exceeding 100% among students in higher education (Brooks, 2016), reflecting the ownership of multiple mobile devices by many individuals. Many secondary and tertiary education institutions now encourage students to bring and use their own devices (Afreen, 2014), enabling users to have familiarity with their chosen device whilst adding a degree of seamlessness to the learning process (Andrews, Davidson, Hill, Sloane & Woodhouse, 2009). A personalised mobile device also permits access beyond controlled learning environments, allowing students to actively partake in independent learning both on and off campus (Afreen, 2014). Students’ choices regarding the use of mobile learning are dependent on many factors, both intrinsic and extrinsic. In making choices, students use agency, which arises from their ability and desire to set goals and act on them (Bandura, 2002).

Vogel and colleagues (2009) stated that effectiveness of mobile learning is shaped by three dimensions, the human, design and institutional dimensions. However, most studies to date have focused on the institutional and design dimensions, such that there was a lack of knowledge regarding the human dimension (Sha, Looi, Chen, & Zhang, 2012; Wali, Winters, & Oliver, 2008). The course that was the subject of this study had no learning tasks which specifically required mobile devices, allowing the human dimension to be examined. This meant the impact of students’ application of agency and their motivations in choosing learning behaviours, specifically those related to their use of mobile learning, could be evaluated. Motivation directs students towards their goals and affects the learning strategies and cognitive processes they employ (Pintrich, 2003), it can originate intrinsically or extrinsically (Hartnett, George, & Dron, 2011; Orsini, Evans, & Jerez, 2015). With this course design, there was little extrinsic motivation for mobile device use, so the use of mobile devices by students was likely to be intrinsically motivated.

For mobile learning to be effective, there is an expectation that learners can distinguish what, where, and how to learn (Sung, Chang, & Liu, 2016). Mobile learning can therefore be considered to facilitate students’ behavioural and cognitive control over their learning, that is, their self-regulation. Self-regulated learning is a cyclical process in which a learner creates a plan for a task, monitors their progress and performance, and reflects on the outcome (Zimmerman, 2002). Mobile learning may facilitate self-regulation through ease of access to information, collaboration and course content, by increasing communication amongst students and between students and teachers (Najmi and Lee, 2009), ensuring fast and effective feedback and increasing motivation (Bull, McEvoy, & Reid, 2003; Jan, Khan, & Zaman; Kim, Rueckert, Kim, & Seo, 2013).

However, the extent to which learners engage with mobile technologies may be limited by their acceptance of that technology and their confidence in using it, that is, their technology self-efficacy. The ‘technology acceptance model’ (TAM) is the most widely recognised model of acceptance (Davis, Bagozzi, & Warshaw, 1989). It explains the behaviour that learners exhibit when using technology, identifying two central constructs, perceived usefulness and perceived ease-of-use (Davis et al., 1989). Perceived usefulness is the extent to which a student believes a proposed system will be useful and will enhance their performance, whereas perceived ease-of-use is the degree to which a student believes that a system’s use would be effort-free (Davis et al., 1989). Venkatesh and Davis (2000) believed that self-efficacy is the most influential variable on new technology use, so modified the TAM to include cognitive and social processes which influence self-efficacy. This contrasts with perceived
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