Evaluating the Effectiveness of a Mobile Location-Based Intervention for Improving Human-Computer Interaction Students’ Understanding of Context for Design

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ABSTRACT

With the ubiquity of interactive computer-based systems, designers are challenged to ensure the effectiveness and efficiency of their designs for a variety of different environments and user activities. To achieve this, designers need to have a comprehensive understanding of the relevant contexts and of the people for whom they are designing systems. Therefore, in helping students learn how to become proficient and innovative designers and developers, it is crucial to get them out of the classroom and into the environments in which their designs will be used. In this paper we describe an app designed to provide location-based hints and formative feedback to students to aid their understanding of the context. The results show an improvement in scores and quality of assessed work completed with the support of the app and a positive response from students regarding its usability and pedagogic utility. The paper also considers the challenges of conducting an ecologically valid study of such interventions in a higher education setting.

Keywords: Design, Evaluation, HCI, Location-Based, Mobile Learning

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INTRODUCTION

In recent years mobile learning has been growing as a significant research area encompassing educational technologies, mobile and wireless computing, and mobile Human-Computer Interaction. It is increasing in popularity with the advancement of mobile technologies and the widespread use of smart phones and tablet PCs and has been incorporated into many disciplines such as Science (Hwang et al., 2009; de-Marcos et al., 2010), Computing (Hwang et al., 2010; Yau & Joy, 2008), and Language learning (Chen & Hsu, 2008; Guerrero et al., 2010) to name but a few.

According to Jones et al. (2007, 2006) there are six key motivators for the use of mobile devices in learning. These include: control, where learners have the freedom to choose the activities that help in achieving their goals; the feeling of ownership and appropriation; the element of fun and entertainment that mobile devices intrinsically afford; ease of communication and collaboration between learners; allowing learners to find information where they are, that is relevant to that context; and continuity between contexts, meaning that learners can continue to use resources found in one setting as they move to another.

Brown et al. (1989) recommend that teachers or instructors create authentic contexts for students’ learning. Lave and Wenger (1991) propose the situated leaning paradigm, arguing that the situation in which learning occurs has a great effect on learners and that learning must not be abstract and out of context. It is situated, and takes place within the context, activity, and culture in which it occurs as a “legitimate peripheral participation” process.

Herrington et al. (2000) propose the following elements for situated online-learning using multimedia: authentic contexts and activities, access to expert performances and the modeling of processes, multiple roles and perspectives, collaborative construction of knowledge, coaching and scaffolding, reflection to enable abstractions to be formed, articulation to enable tacit knowledge to be made explicit, and integrated authentic assessment.

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The fact that it is important that learning should be presented in an authentic setting supporting knowledge exchange between learners is also echoed by Naismith et al. (2004).

Holzinger et al. (2005) describe situated learning as employing a blend of constructivist and cognitive methods, where the situation plays a significant part in the learning construction process. In considering context, research has shown that while learning outdoors can help learners develop their knowledge and add meaningful and valuable experience, it is important that the activity is “properly conceived, adequately planned, well taught and effectively followed up” (Dillon et al. 2006). Lunce (2006), in designing situated learning using simulation, suggests four criteria for situated learning: a specific context that impacts learning must be defined; peer-based interactions and collaboration between students must take place; knowledge is tacit; and tools must be used to accomplish real-time objectives.

The additional strength of mobile learning lies in the scope of the functionality offered by the evolving mobile technologies. Being able to design systems which sense the location of the learner offers great potential for the design of innovative and effective learning resources. Ryu and Parsons (2008) argue that mobile learning can successfully integrate with and aid learning enabling students to benefit significantly from any contextual help provided.

In more recent studies, definitions of the key characteristics of situated learning differ depending on the technology (Yusoff et al., 2010). When designing situated learning using mixed reality technology, Yusoff et al. (2010) outline three main elements: authentic context, authentic activity/task, and users’ collaboration. While situated learning has several benefits, we should be aware of the limitations of the claims as discussed by Reder et al. (1996) who note that pragmatic aspects such as students’ time constraints and logistics of scheduling activities can result in a division of labour, which can
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