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THE IMPACT OF RELEVANCE, AESTHETICS AND ENJOYMENT ON IPAD TRAINING

Dezhi Wu

Iris Reychav

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Dezhi Wu
Department of Computer Science & Information Systems
Southern Utah University
Cedar City, UT 84720, USA
wu@suu.edu

Iris Reychav
Ariel University, Israel
irisre@ariel.ac.il

ABSTRACT:

Road safety training is a critical subject which impacts both individuals and society at large. In this study, we designed and implemented a mobile road safety training program in iPads. We aim to examine whether content and interface design impacts both the usability and usefulness of the iPad road safety training program, and in turn, how user iPad experience influences learning. One hundred and eight-two motorcyclists were recruited when they took the road safety training on site. A questionnaire was designed to collect data. The study results indicate that both users' perceptions of information relevance and iPad interface aesthetics significantly impact perceived usability and usefulness, and thus positively affect user training outcomes.

Keywords: mobile training, mobile learning, human-computer interaction, HCI, multimedia, tablet technologies, iPad

I. INTRODUCTION AND STUDY BACKGROUND

Rapid advancements of emerging mobile technologies such as smart phones, tablets, and laptops have changed how people communicate and learn. The adoption of mobile devices in training sectors and higher education has been growing increasingly worldwide (Traxler, 2007). In general, learning facilitated and supported by mobile technologies refers to mobile learning (m-learning), which extends students' learning experiences outside classroom, and enhances students' thinking abilities (Shih et al., 2010). El-Hussein and Cronje (2010) argue that mobile learning is associated with the mobility of technology, which increases learner mobility, and offers the mobility and dynamics of the learning processes and the flow of information.

Many mobile learning practices have taken place in classroom, community and discourse (Katz & Aakhus, 2002; Brown & Green, 2001). In addition to higher education, practitioners have started to use mobile devices in corporate trainings to improve their mobile workers' productivity and efficiency (Gayeski, 2002; Pasanen, 2003). This practice has been expanding to a variety of different fields, such as music composition (Polsihhook, 2005), nurse training (Kneebone, 2005), and numerous other disciplines.

As one of the leading cause of disease and injuries, road traffic injuries deserve serious attention (Krug, 2012), so road safety training is critical and beneficial to both individuals and society at large. In this study, due to intuitive "multi-touch" and aesthetic user interfaces, we used one of the most popular tablet technologies (i.e., iPads) to facilitate a road safety training program. We aim to explore whether using the iPad enhances user experiences, in particular, we examine whether users' perceived information relevance, perceived iPad interface aesthetics and multimedia enjoyment influence system usability and usefulness, and in turn, how this experience influences user's perceived training outcomes on the iPads.

This paper proceeds as follows. Following study introduction and background, we propose a set of hypotheses to examine the effects of users' perceived information relevance, interface aesthetics and multimedia enjoyment on user learning outcomes. Preliminary data results demonstrate that the majority

of proposed hypotheses were supported. Lastly we discuss the study findings and future research directions.

II. RESEARCH HYPOTHESES

In order to shed light on how iPad technology can mediate and facilitate the road safety training, we propose to examine whether "perceived information relevance," "perceived interface aesthetics" and user perception of multimedia enjoyment affect users' perceptions of iPad system usability and usefulness, and furthermore how those factors impact training outcomes.

Kahneman (1973) states that humans only have a limited amount of attention available, and thereby an "orienting response" (Ohman, 1997) is developed to respond to a variety of stimuli from the external world in order to hold attention for relevant stimuli (Yantis and Egeth, 1999). For example, only selected relevant information is processed in humans' visual channels to process graphical information (Van der Heijden, 1992). In the road safety training context, users actively seek relevant information to be able to prepare for the their motorcycle license exams, so the relevant information included in the iPad training program is likely to affect the training system usability and users' perception about the usefulness of training. Thus, we propose:
H1. Users' perceptions of information relevance are likely to positively impact users' perceptions of system usability.
H2. Users' perceptions of information relevance are likely to positively impact users' perceptions of training usefulness.

Numerous studies have been conducted to investigate users' aesthetic experiences in different contexts, such as e-loyalty (Mithas et al., 2007), Web usage (Van der Heijden, 2003), online services (Lopes & Galletta, 2006) and so on. Although mixed study results were reported for the relationship between aesthetics and usability (Lindgaard & Dudek, 2003; Hassenzahl & Monk, 2010), the majority of them found a strong correlation between them (Deng et al., 2010), which enhances user satisfaction. Qinn & Tran (2010) found that attractiveness had the greatest impact on usability. Lee & Koubek (2010) identified that the effect of perceived aesthetics influenced perceived usability more than objective performance. Hence, we posit:
H3. Perceived interface aesthetics will have a positive effect on users' perception of system usability.

Usefulness concerns whether the system can be used to achieve some desired goals. Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). Sonderegger & Sauer (2010) reported that users rated cell phones with high aesthetics more usable than the unappealing ones. Therefore, we hypothesize:
H4. Perceived interface aesthetics will also have a positive effect on users' perception about the usefulness of training.

In general, perceived enjoyment is regarded as part of intrinsic motivation, which serves as a driving factor for users to interact with educational technologies (Wu et al., 2010). In this study, we refer to "perceived enjoyment" as user positive experiences of interacting with multimedia elements in the iPad. Lauriilard (2002) found that multimedia contents are likely to relax students and thereby enhance their problem-solving abilities. Since users use their fingertips rather than a mouse or a stylus to interact with the multimedia elements designed in the iPad, it is likely that users will perceive this iPad interaction as a more natural and effective way to achieve their goals, which are to learn the training materials in order to pass their license exams in this context.

Therefore, we hypothesize:
H5: The multimedia enjoyment provided by the iPads is likely to have a positive relationship with perceived usability.
H6. The multimedia enjoyment provided by the iPad is likely to have a positive relationship with perceived training usefulness.

In this study, we mainly focus on users who take a road safety-training program on the iPad. The learning outcomes are expected to be impacted by both the users' perceptions about the usefulness of training and system usability, since a usable and easy-to-use system should offer users an enjoyable learning experience to gain useful knowledge about road safety. Additionally, users' perceptions about the usefulness of the training is also proposed to have some impact, since the goal of this training is to help users to obtain their motorcycle licenses, and in turn, these factors will impact their learning outcomes. Hence, we propose:

H7. Perceived system usability is likely to have a positive impact on users' perceived learning outcomes.
H8.Perceived usefulness of the training is likely to have a positive impact on users' perceived learning outcomes.

Mayer (2003)'s study found that the most effective multimedia learning occurs only when the instructional content is relevant and is aligned to learning objectives. His study also indicates that relevant information helps build cause-and-effect relationships (Mayer, 1997), and therefore facilitates active learning (Mayer et al., 1999). In this process, humans actively select relevant information for organizing and integrating materials. Irrelevant information must be filtered in the selecting phase. Utilizing limited cognitive resources on irrelevant information is a detriment to learning, so proper instructional design is suggested to allocate brain resources for essential information. Therefore, we predict:
H9. Perceived information relevance will have a positive effect on users' perceived learning.

Cawthon & Moere (2007) studied eleven data visualization techniques, and they found positive relations between aesthetic data visualizations and performance of data retrieval tasks. Quinn and Tran (2010) similarly found more effective task performance when using attractive versus unattractive mobile phones. Therefore, we hypothesize:
H10. Perceived interface aesthetics will have a positive effect on users' perceived learning.

In a series of participatory examination field studies in both the United States and Austria supported by computer mediated communication technologies, Wu et al. (2010) found a very significant relationship between students' perceived enjoyment and their learning outcomes. Therefore, we predict in the iPad road safety training context:
H11. Perceived multimedia enjoyment will have a positive effect on users' perceived learning.

III. RESEARCH METHODOLOGY

Data Collection Procedure

We designed and implemented an iPad road safety training program for a local government road safety authority. In order to test the system, the study subjects were recruited when they were on the way to take their motorcycle driver license tests on site. The study participation was completely voluntary. We first asked them to fill out a pre-questionnaire to get their pre-perceptions about the road safety training they were going to take before the license exam. Then they were asked to go through a 20-minute training program on the iPad, which included four videos and different simulation cases demonstrating road-safety rules and potential dangers for motorcycles. The contents for this training were prepared by the road-safety authority. Following the training, they were asked to complete a post-questionnaire, which we intended to examine their perceptions of using the iPad technology and their assessment of actual training outcomes.

Subjects

In total, one hundred and eighty-two subjects were recruited. The average age of subjects was 24.76. Among users, 179 were male and only 3 were female. Over 65% of subjects had more than four years of computer experience. About 42.9% of users had used the iPad before they participated in this study.

Data Analysis Results

We used SPSS and AMOS (Arbuckle, 2005) for data analysis for this study. The reliability of the survey instrument was established by calculating Cronbach's alpha values to measure internal consistency.

Each construct was tested for reliability and content validity, using Cronbach's alpha (Cronbach, 1971). Most of the scores were above the acceptable level, which is above 0.70.

For convergent validity and discriminant validity, we also reached a satisfying level suggested by Fornell and Larcker (1981): (1) all of the factor loadings were significant and exceed 0.7, (2) average variance extracted (AVE) by each construct exceeded the variance due to measurement error for that construct, and (3) the square roots of the AVEs were greater than the correlation shared between the construct and other constructs.

To test the proposed hypotheses, we employed a structural equation model (SEM) analysis. The majority of proposed hypotheses (10 out of 11) were significantly supported. Only perceived usability is not significantly related to perceived learning outcomes (H7, not supported). It is likely when road users were anxious to take their driver license exam on site, since they perceived training usefulness much more significant than their perception on usability.

IV. DISCUSSIONS

Recent studies have investigated a variety of different emerging mobile technologies in higher education and training sectors, but few of them directly focus on the relationship of the content and interface design of the mobile IT artifact to system usability and learning outcomes. Based on our preliminary study results, information relevance and perceived iPad interface aesthetics are identified to be two critical factors for developing effective training programs on the iPad. In other words, the quality of training contents relevant to users' training needs and highly interactive iPad user interfaces effectively mediated and facilitated the training processes. Therefore, our effort was made to fill the gap of bridging mobile technology difficulties and learning through incorporating higher-quality interface design components (i.e., multimedia, and interface aesthetics) and users' cognitive needs for information relevance to training. This study contributes a timely study to the information systems field by evaluating one of the newest IT artifacts—the iPad—in a road safety-training context. Our study is probably one of the first few studies to evaluate iPads in the road-safety context, which impacts our society at large. To practitioners, it is helpful to learn that incorporating multimedia elements and designing better interfaces enhance learning quality, so future instructional design and implementations in mobile technologies can be benefited from this study.

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