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Exploring the antecedents of collaborative learning performance over social networking sites in a ubiquitous learning context

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ABSTRACT

Recent mobile and Internet applications have made possible the development of ubiquitous learning (U-learning). One such application is social networks, which allow people to create and exchange information with each other in a collaborative manner, and these are especially popular with so-called "digital natives," who have grown up using such technologies. This study thus explores the behavioral models associated with using social network websites in a U-learning context. To carry out a more comprehensive investigation, a modified technology acceptance model (TAM) is developed, augmented with external factors, including collective efficacy and personal innovativeness in information technology (PIIT). This model is then used to examine the influential factors in students' use of social networks to learn, and also to evaluate their learning attitudes and usage effects. This study collected 321 valid questionnaires and used them to test the proposed model. The results show that personal innovativeness in information technology and collective efficacy affect learner attitudes through perceived playfulness, perceived usefulness, and perceived ease of use, and in turn affect dimensions, such as satisfaction, self-perceived usage effects, and continued usage intention. Based on these results, instructional designers should work to use the diversity and richness of existing social network sites to enhance learner perceptions of the playfulness and usefulness of information technology, which in turn can produce more positive usage attitudes and greater learning satisfaction.

1. Introduction

Social network sites, such as Facebook and Google+, have become very popular in recent years, as they provide an easy to access and efficient way for people to exchange information with people that they know (Rau, Gao, & Ding, 2008). Social networking websites allow users to post ideas and links, and to share and comment on those posted by others, which can increase the level of interaction that occurs among students (Cheung, Chiu, & Lee, 2011). In addition, the rapid development and consumer acceptance of mobile devices and wireless networks has promoted the use of social networking sites in mobile and ubiquitous learning environments (Huang, Chiu, Liu, & Chen, 2011; Lewis, Pea, & Rosen, 2010).

Young people, often termed "digital natives," are especially involved in online communities (Madge, Meek, Wellens, & Hooley, 2009), and thus students are well-positioned to learn autonomously and exchange knowledge with each other using such platforms. Wang and Wu (2008) showed that students have considerable self-regulating abilities with regard to learning online, and often receive and provide feedback when interacting with others, thus leading to greater learning effectiveness. It is thus necessary to carry out further explorations of the use of social network sites as learning environments, to see how they can be used more effectively.

Social networking sites have become popular e-learning platforms for sharing knowledge and thus carrying out collaborative learning (Rau et al., 2008). Such sites can help learners to former more and better social connections with each other, thus better enabling them to share ideas, create products, construct identities, and receive timely feedback (Greenhow, 2011). For example, social networking sites have been utilized as a virtual classroom for learning language, and have provided a communication and entertainment platform for college students (Blattner & Fiori, 2009), and have also been used to develop students' creativity and communication skills (Kabilan, Ahmad, & Abidin, 2010).

In recent years, many studies have emphasized the importance of collaborative learning, which has been shown to be an effective instructional method (Cohen, 1994; Isman & Celikli, 2009; Lin, Huang, & Cheng, 2010; Moon, Jang, & Kim, 2011), because it can

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promote the development of self-efficacy, enhance learning motivation and active learning attitudes, and lead to improved learning outcomes (Huang & Wu, 2011; Johnson & Johnson, 1989). However, few studies have explored collaborative learning in a U-learning context (Hwang, Shi, & Chu, 2011; Liu & Chu, 2010). Therefore, this study attempts to introduce collaborative learning strategies into a U-learning environment, and use team cooperation to enhance peer interaction, thus aiming to effectively enhance the learning achievements and learning motivation of students.

Collaborative learning can occur on social network sites, as they can be used to help individuals work together to complete a collective objective (Cheung et al., 2011; Rau et al., 2008). However, and as noted above, it is thus necessary to understand how to inspire more effective cooperative behavior in this context. Social cognitive theory (SCT) is an important theory used to explain cooperative relationships in the literature on collaborative learning, examining issues such as self-efficacy and expected outcomes, as well as computer usage and Internet behaviors (Compeau & Higgins, 1995; Hsu & Lu, 2004; Thompson, Meriac, & Cope, 2002). SCT proposes that collective efficacy originates from Bandura's theory self-efficacy. Bandura (2001) claimed that people do not exist in isolation, but instead need to work together to achieve their goals in an interdependent manner. However, these studies have not explored many of the intrinsic characteristics of social networks, and SCT should thus be considered when exploring the issues of collective efficacy and group performance in a social network context, as this theory expands the concept of human motivation to collective agency, and that of self-efficacy to the collective level (Bandura, 1986, 1997). Many previous studies have shown that collective efficacy can effectively explain group behaviors with regard to cooperation and performance (Baker, 2001; Bandura, 1997; Wang & Lin, 2007). However, no studies have used collective efficacy to explore learners' acceptance of the collaborative learning environment that social networks provide, or the related usage effects. This study thus employs collective efficacy as the first personal characteristic variable of learners in a social network collaborative learning environment. This is because if group or organizational collective efficacy can be raised, then it is more likely that group objectives can be achieved.

Learners' acceptance of the related technologies is obviously an important factor in the use of social network sites in U-learning environments, and the technology acceptance model (TAM) can be used to examine this issue. TAM is a behavioral beliefs model developed in Davis (1989) based on the theory of reasoned action (TRA), and asserts that perceived usefulness and ease of use would affect attitude toward use, in turn affecting actual behavioral performance. TAM thus emphasizes the influence of user perceptions on usage intentions and behaviors, although it does not involve any external environmental considerations (Dishaw & Strong, 1999). Agarwal and Karahanna (2000) proposed that if individuals have higher personal innovativeness in information technology (PIIT), then they are more confident in their abilities in use a new information technology. PIIT is defined as the willingness of an individual to try a new information technology. As learners face the new learning context on social network sites, the extent to which they are willing to try a novel technology would influence their beliefs, attitudes, and usage effects with regard to the technology (Agarwal & Prasad, 1998). This study thus uses PIIT as the second personal characteristics variable. In addition, Moon and Kim extended TAM by including an intrinsic motivation factor, perceived playfulness, based on the concept of flow. Playfulness is an important factor which can motivate users to utilize a system (Chen, Wigand, & Nilan, 1999). In this study, perceived playfulness is defined as when learners think the manner and content of the activities are pleasant and enjoyable in the social networking site learning environment.

Based on the above discussion, this study primarily explores the behavioral models of learners using social network sites to engage in collaborative learning in a U-learning context. It mainly extends Moon and Kim's (2001) TAM framework adding personal characteristic and group characteristic variables, namely PIIT and collective efficacy, respectively, with perceived playfulness as the independent variable, to explore learners' acceptance of social network sites and the related usage effects in a U-learning environment. The aim is to establish a comprehensive evaluation model so that instructors and researchers can take advantage of existing social networking sites for pedagogical purposes.

2. Theoretical background

This study explores learners' acceptance and usage of social network websites as a collaborative learning platform in a U-Learning environment. The related literature and theoretical bases are used to construct the research model. This model includes TAM, collective efficacy theory, and an evaluation method for a learning platform.

2.1. Technology acceptance model (TAM)

TAM is a behavioral belief model that was developed by Davis (1989), based on theory of reasoned action (TRA), and asserts that perceived usefulness and ease of use would affect attitude toward use, in turn affecting actual behavioral performance. There are five main dimensions in TAM, which are perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and system usage.

Van Raaij and Schepers (2008) applied TAM to a virtual e-learning environment, and the results proved that perceived usefulness has a significant effect on system usage, while perceived ease of use indirectly affects system usage through perceived usefulness. Even when applied to e-learning system verification in general workplaces, TAM can predict user behavioral intentions to use such technologies (Liaw, 2007; Ong, Lai, & Wang, 2004), with Liaw (2007) proving that perceptions have a major effect on behavioral intentions.

Perceived playfulness has been widely adopted in recent studies of technology usage behavior (Morosan & Jeong, 2008; Roca & Gagne, 2008). Focusing on the information technology usage model, perceived playfulness is defined as having three dimensions (Deci & Ryan, 1985; Moon & Kim, 2001): concentration, curiosity, and enjoyment. The concept of technology acceptance of the internet has been used to design a perceived playfulness scale for consumers online (Moon & Kim, 2001).

2.2. Collective efficacy theory

Social cognitive theory expands the concept of human motivation to collective agency, developing the concept of self-efficacy to the collective level, naming it collective efficacy (Bandura, 1986, 1997). Collective efficacy refers to the determinations of individual members with regard to group ability when a group faces specific tasks. This has a key influence on group cooperation and performance (Baker, 2001; Bandura, 1997), and thus if it can effectively enhance organizational or group collective efficacy, it would help to improve group achievements.

2.3. The relationship between collaborative learning and collective efficacy

The concept of collaborative learning developed from the work of psychologists (Johnson & Johnson, 1989; Slavin, 1987), and is