Factors that influence acceptance of web-based e-learning systems for the in-service education of junior high school teachers in Taiwan

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ABSTRACT

Web-based e-learning is not restricted by time or place and can provide teachers with a learning environment that is flexible and convenient, enabling them to efficiently learn, quickly develop their professional expertise, and advance professionally. Many research reports on web-based e-learning have neglected the role of the teacher's perspective in the acceptance of using web-based e-learning systems for in-service education. We distributed questionnaires to 402 junior high school teachers in central Taiwan. This study used the Technology Acceptance Model (TAM) as our theoretical foundation and employed the Structure Equation Model (SEM) to examine factors that influenced intentions to use in-service training conducted through web-based e-learning. The results showed that motivation to use and Internet self-efficacy were significantly positively associated with behavioral intentions regarding the use of web-based e-learning for in-service training through the factors of perceived usefulness and perceived ease of use. The factor of computer anxiety had a significantly negative effect on behavioral intentions toward web-based e-learning in-service training through the factor of perceived ease of use. Perceived usefulness and motivation to use were the primary reasons for the acceptance by junior high school teachers of web-based e-learning systems for in-service training.

1. Introduction

Advances in information technology have promoted web-based e-learning and accelerated knowledge delivery through the Internet. The web-based e-learning environment is so convenient that online and lifelong learning have gradually become a trend in education (Chen & Shi, 2002). In today's rapidly changing information society characterized by the current web-based e-learning environment, the traditional face-to-face learning style is no longer sufficient (Hamalainen, Whinston, & Vishik, 1996). Indeed, the exclusive use of traditional face-to-face learning methods does not effectively provide learners with instant feedback, which is increasingly expected in a society in which rapid communication has become the norm. The real-time nature other features of web-based e-learning render it an efficient way to acquire new information gain knowledge (Edwards, 1996). Apart from offering abundant learning resources, web-based e-learning can also enable learners to create knowledge by themselves and to provide individual learning paths and strategies (Eastmond, 1997). Web-based e-learning systems can incite interest in learning according to individual pedagogical demands and needs. Compared with rigid, traditional textbooks, the teaching material offered by web-based e-learning offer learners a variety of content and the experience of self-directed learning (Tang, 2008).

Technology has changed lives and has also substantially increased the pace of life; learning, however, cannot wait. Everyone hopes that he/she will be able to acquire knowledge in the shortest period of time. Traditional instruction restricts a learner's time and space and indeed robs learning of the convenience of choosing the time to learn, which can even cause learners to lose the motivation to learn (Chen & Huang, 2010; Hung, 2007; Rovai, Ponton, Wighting, & Baker, 2007). Web-based e-learning has been promoted in government institutions to improve national digital competitiveness, a practice that also serves as an excellent example of lifelong learning. Additionally, some enterprises have successively introduced web-based e-learning as a platform for the education and training of employees, thus creating a shared learning environment for these enterprises and strengthening the professionalism and information-related competencies of employees (Sridhar, 2005). Although many important studies have focused on web-based e-learning, none has analyzed web-based e-learning systems from the perspective of teachers (Chen & Huang, 2011; Huang, Kuo, Lin, & Cheng, 2008; Hwang, Hsu, Tretiakov, Chou, & Lee, in press; Lee, Cho, Gay,

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Davidson, & Ingraffea, 2003; Rovai et al., 2007). Web-based e-learning without the limitations of time or space provides teachers with a flexible and convenient learning environment. It also enables teachers to learn efficiently and to easily acquire professional education, an approach unparalleled by traditional teaching methods.

On the basis of a review of the previous literature, we analyzed the factors that affected the participation of teachers in web-based e-learning in the context of in-service education. We also identified factors that significantly influenced the participation of junior high school teachers in web-based e-learning and confirmed the applicability of the TAM to this domain. TAM introduced the two new perspectives on perceived usefulness and perceived ease of use that can explain and predict factors that influence use of and attitudes toward new technology (Davis, Bagozzi, & Warsaw, 1989). This model has been applied in a wide range of research fields (Chen & Huang, 2010; Heijden, 2003; Lee et al., 2003). This study had the following objectives: (1) to analyze the factors that affected the intentions of junior high school teachers' toward the use of web-based e-learning for in-service education. (2) To identify the most significant factors affecting the participation of junior high school teachers in web-based e-learning in the context of in-service education.

2. Literature review

As a learning model unrestricted by time or space, e-learning is a type of remote learning. In addition to integrating learning and the Internet, it also enables learners to develop their professional knowledge, to select the information they need, and to set the pace of their own learning (Egan, 2000; Howard, 1999). Learners can use the Internet to obtain educational content, and it is possible to extend e-learning via e-learning assistance and community knowledge-sharing systems (Sridhar, 2005). Through the Internet, e-learning allows digitized instructional materials to be quickly and efficiently transmitted, lowers production costs, and greatly lowers the time needed for learners to search for the educational content needed to engage in self-directed study. Schaaf (1999) asserted that e-learning was the most cost-effective educational and training tool, enabling the learner to obtain abundant and diverse content quickly (Powell & Barbour, 2011). Obstacles that are encountered during the process of e-learning can be discussed with teachers or peers through the Internet in a process of cooperative online learning, which enhances the interactive aspects of learning. Furthermore, the Internet accelerates the speed of updating educational content, enabling the learner to access new knowledge faster. Thus, e-learning has been seen as an efficient learning method (Bielawski & Metcalf, 2005; Chen & Huang, in press-a).

E-learning can lower training costs and improve learning efficiency. Indeed, when corporations introduce e-learning, they do so with hopes of achieving success or at least understanding the factors that influence e-learning. E-learning has shortened the digital divide in that it has decreased the effect of the gap between those who use information technology and those who are unable to use information technology effectively. For example, the research at the Aborigine Internet Academy explored the factors that influenced the adoption of e-learning by adults of aboriginal ancestry according to different background variables (Tang, 2008). It is also possible to explore the motivation of junior high school teachers located in remote areas to engage in e-learning by participating in network learning communities that promote professional development (Huang, 2006). The development of e-learning has allowed the transmission of information between cities and villages, which also decreases the digital divide. However, different levels of self-efficacy have been associated with differences in the acquisition of information via technology, and the perceived utility of the information provided is associated with differences in the motivation of teachers to use information technology (Kuo, 2008; Yang, 2007).

In the context of advances in information technology and the proactive role played by the government with respect to educational policies, teachers now need to engage in lifelong learning to increase their professional expertise and enhance their pedagogical abilities. Thus, although teachers must participate in various advancement courses, traditional seminars and observational training may not be able to meet the needs of teachers with respect to the pursuit of professional development. However, an e-learning system focused on the needs of teachers has emerged as an approach to filling this gap (Fang, 2004). Nonetheless, it is important to consider research showing that computer anxiety can influence the usage intentions of e-learners (Wang, 2006; Yeh, 2002). Teachers' substantive field and role within the educational system significantly affect their computer anxiety (Shen, 2002).

The TAM was developed by modifying the theory of reasoned action (TRA), which has been used to explain and predict user acceptance of information systems (Davis, 1986). The primary purpose of this model was to understand the influence of external factors on the beliefs, attitudes, and intentions that influence the use of technology. This model introduced the two new perspectives on perceived usefulness and perceived ease of use that can explain and predict factors that influence use of and attitudes toward new technology (Davis et al., 1989). After its original exposition, the TAM was at the center of a substantial body of empirical research and exploration and has been widely used for predicting the acceptance, adoption, and use of information technology (Adams, Nelson, & Todd, 1992; Selim, 2003; Szajna, 1996). Previous empirical studies have shown that perceived usefulness and perceived ease of use had a direct effect on behavioral intentions (Venkatesh & Davis, 1996). Venkatesh and Davis (2000) believed that removing attitudinal factors from the TAM could help in improving our understanding of the relationships among perceived usefulness, perceived ease of use, and intention to use systems. This model has been applied in a wide range of fields including those focused on the Internet (Lederer, Maupin, Sena, & Zhuang, 2000), news websites (Lin & Lu, 2000), information systems (Heijden, 2003), e-learning (Lee et al., 2003), online shopping (Gefen, Karahanna, & Straub, 2003), and online gaming (Hsu & Lu, 2004). Perceived usefulness has been identified as the primary reason for the acceptance of e-learning systems by corporate organizations (Chen, 2004; Hong, 2008). Furthermore, perceived ease of use has been cited as the primary influence on behavioral intentions, and self-efficacy has been underscored as a key influence on perceived usefulness (Ong, Lai, & Wang, 2004).

3. Research model and hypotheses

The purpose of this study was to explore the factors affecting the acceptance of web-based e-learning systems among junior high school teachers in Taiwan. We used the revised version of the TAM proposed by Venkatesh and Davis (1996) as the theoretical foundation for this research. Based on the literature review presented in the previous section, we identified the following as factors that influence the acceptance of web-based e-learning: motivation to use, computer anxiety, and Internet self-efficacy. The relationship among these three external variables and perceived usefulness and perceived ease of use was explored. The framework for and the hypotheses tested by this study are presented in Fig. 1.

H1: The motivation of teachers to use web-based e-learning systems for in-service education will have a significant positive influence on perceived usefulness.