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Internet cognitive failure relevant to users' satisfaction with content and interface design to reflect continuance intention to use a government e-learning system

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ABSTRACT

Government e-learning systems have been established for employees in public sectors. To understand the effectiveness of using the systems, the present study focused on the content and interface design of a government e-learning system in Taiwan to explore factors relevant to users' continuance intention to use the system. Data from 150 effective questionnaires were returned for confirmatory factor analysis with structural equation modeling. The results showed that if the users have a high level of Internet cognitive failure, they will have low satisfaction with the content design and interface design of the e-learning system. The results also showed that if users are satisfied with the content design and interface design, they will perceive utility value. Finally, if the users perceive utility value, they will have continuance intention to use the government e-learning system. The results of this study implied that the psychological trait, Internet cognitive failure, plays an essential role for determining the usage of a government e-learning system. In addition, when designing government e-learning systems and deciding where to expend efforts, one should consider how the content and interface design interacts with behavioral intention mediated by utility value.

1. Introduction

Electronic learning (e-learning), a new approach in education, highlights learner-oriented and life-long teaching/learning processes (Ong, Lai, & Wang, 2004). E-learning systems can be used anytime and anywhere, and knowledge sharing and learning through the Internet can increase users' motivation to learn. E-learning also allows on-job-training to be extended to diverse and geographically dispersed workforces in a cost-efficient manner and can be implemented on-demand and at a lower cost than on-site learning (Lee, Hsieh, & Ma, 2011). Nevertheless, a survey on the use of e-learning conducted by the National Science and Technology Master Plan Program of e-learning (Taiwan Institute for the Information Industry, 2012), revealed that there was a low ratio of active adult users of government e-learning systems and the users experienced poor learning satisfaction. Stoffregen, Pawlowski, and Pirkkalainen (2015) in reviewing e-learning barriers also found there is a gap between satisfaction with system and usage expectancy when introducing e-learning in public sectors. Thus, the question arises as to why users were not satisfied with the government e-learning systems. Although the aforementioned e-learning survey reported low user satisfaction in general, there may be some users who are satisfied, and this implies that individual experiences can enable one to be more or less satisfied regarding their utility perception and attitude towards e-learning (Johnson & Sinatra, 2013).

Whereas research on the acceptance of novel technologies has primarily centered on cognitive dimensions, awareness of the importance of affective dimensions of design in relation to perceptions of utility is growing (Cyr, Head, & Ivanov, 2009). A cognitive-affective model for explaining satisfaction with or acceptance of novel technologies has been highly influential in interface design (Bhattacherjee, 2001a); however, recent research has shown that interface design alone cannot fully explain

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empirical findings about the perception and use of technologies for learning (Coursaris & van Osch, 2016). In this research, user satisfaction encompassed satisfaction with interface design and also satisfaction with content design. That is, rather than building on either cognitive or affective explanations of user satisfaction, the research model proposed aimed to capture both interfaced design and content design, to construct a more accurate representation of user satisfaction.

Cognitive failure could be the result of internal thoughts (e.g. mind wandering) or external distractions (Broadbent, Cooper, Fitzgerald, & Parkes, 1982). As electronic texts are not static like printed books and magazines (Robinson, 2010), greater effort is required to grasp the information that is presented. When comparing the difference between reading e-learning contents to printed contents, Daniel and Woody (2013) found that it took students significantly more time to read e-learning contents. As a psychological trait, internet cognitive failure has been found to be negatively correlated to users' learning interest when using social media for learning (Authors, 2016). Despite this, the cognitive theory of multimedia learning (CTML) (Mayer, 2005) has highlighted that multimedia facilitates meaningful contexts (Ertmer & Newby, 1993) and Internet usage can enhance student interest by presenting well-designed instructional messages that support cognitive development. Thus, whether internet cognitive failure could also affect users' satisfaction with the interface design and content design of a government e-learning system was the interest of this study.

Perceived effectiveness (i.e. a technology's effect on job performance and enhancing utilitarian value) also plays a pivotal role in users' acceptance of a technology (Coursaris & van Osch, 2016; Coursaris, Hassanein, Head, & Bontis, 2012). Utility could be considered a mediator in the relationship between satisfaction and behavioral intention (c.f., Bhattacherjee, 2001a). Johnson and Sinatra (2013) noted that a user's perception in the utility condition demonstrated the greatest degree of facilitating engagement in future tasks. Pereira, Ramos, Gouvêa, and da Costa (2015) studied educational multimedia in public sectors and showed that quality, value, satisfaction and use intention were positively correlated. Thus, this study attempted to examine how individual Internet cognitive failure interacted with satisfaction with content design (SCD) and interface design (SID) to bond to participants' perceived utility value and their continuance intention to use the an government e-learning system.

2. Literature review

In the barriers and challenges in the development and contextualization of open e-Learning systems, obstacles may arise due to a lack of policy regulations or a poor technical fit of systems to workplaces, which could impede the implementation of learning environments (Pirkkalainen & Pawlowski, 2014). Thus, this study focused on SCD and SID to realize their interaction with an individual trait and the perception of utility.

2.1. Government e-learning systems in the context of Taiwan

The Executive Yuan of Taiwan published an e-learning white paper to strengthen the idea that the learning hours on e-learning systems could count towards the required 30 h of training for public officials (Taiwan Institute for Information Industry, 2012). Accordingly, many government sectors in Taiwan have actively planned and coordinated efforts to introduce relevant mechanisms of e-learning into public service departments. In the past five years, businesses and educational institutions in Taiwan have invested around NTD $200 million to develop e-learning systems. However, the benefits of such systems may not be realized if learners fail to use them (Lee et al., 2011). Chang and Yang (2010) noted that only by extending the evaluation of the overall effectiveness of government information policy to include consideration of the compatibility and utility value of web learning, can e-learning be effectively integrated into public offices to achieve life-long learning. This study attempts to explore user's SCD and SID relevant to utility perception and continuance intention to use a government e-learning system.

2.2. Utility value

Value can measure the user's opinion about the system's efficiency. If it is true that users are value-driven (Levy, 1999), then governments need to understand what users value (Holbrook, 1999). Value is viewed as the essentiality of accomplishing the task successfully (Wigfield & Eccles, 2002, pp. 159–184), whereas utility value relates to how well a task relates to current goals and is a strong predictor of future choices (Eccles, 2005) and the individual's future plans (Vekiri, 2013). Moreover, utility value reflects whether the functions of information systems are able to meet operational needs, whereas utility focuses on the users' effectiveness in transferring knowledge learned to the workplace (Johnson & Sinatra, 2013). Utility value can also reveal the users' experience from actual use of the system (Parasuraman & Grewal, 2000). In line with this, to understand why a government e-learning system is not accepted by the users, the present study examined the relationship between users' perception of the e-learning system's utility values and their continuance intention to use the system.

2.3. Content and interface design

Multimedia design has to address the problems inherent in the design of any user interface (Sutcliffe, Kurniawan, & Shin, 2006). Connolly, Stanfield, and Hainey (2009) found that there are variables relevant to multimedia design that affect overall effectiveness of e-learning, and suggested that interface and course content could be used to explore the effectiveness of e-learning. A system with good interface design is easy to use; users scan the screen and identify relevant information easily. On the other hand, a poorly designed interface (e.g. poorly depicted icons and buttons) can create confusion and misunderstanding (Cho, Cheng, & Lai, 2009). Evidence has shown that interface HCI should guide attention-directing design to achieve salient effects in different media (Gardiner & Christie, 1987; Sutcliffe, 2003), based on cognitive models of users' attention and information-processing abilities (Wickens, 1992). With the foci of attention-directing design, designing human-computer interface may be necessary as a conduit to e-learning applications (Rosson & Carroll, 1995).

Regarding e-learning content design, Al-Samarraie, Teo, and Abbas (2013) found that presenting content with good structure could influence learners' attention, which in turn may cause them to think deeply and help them achieve understanding. If the learners could not figure out how the contents should be connected, they would not be able to understand the meaning of the information presented to them (Lee, 2009). Previous studies have examined the effects of content quality to see if participants could understand the content, such as animating the content to improve learning system usability (Wickens, Liang, Prevett, & Olmos, 1996; Woods & Hollnagel, 2006). Studies have noted that educators should design good content and interface for digital learning curricula in e-learning systems (e.g., Belisle, 2007; Reisetter, Lapointe, & Korcuska, 2007). In addition, Sung, Chang, and Yu (2011) suggested that the learning interface and learning content