Investigating e-learning system usage outcomes in the university context

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ABSTRACT

This paper investigates the outcomes of e-learning systems adoption and use by conceptualizing three e-learning systems adoption outcome constructs namely perceived learning assistance, perceived community building assistance and perceived academic performance. Utilizing these constructs, the paper proposes a research model for assessing the possible outcomes of e-learning systems adoption and use. The study collected longitudinal survey data from 249 university students participating in hybrid courses using a popular learning management system, Moodle. Partial least squares (PLS) approach was then used to test the research model.

The findings suggest that beliefs about perceived usefulness and perceived ease of use, and how an e-learning system is used influence students' perceived learning assistance and perceived community building assistance. In turn, perceived learning assistance and perceived community building assistance influence the students' perceived academic performance.

1. Introduction

With the latest development of Internet technologies, universities are investing considerable resources in e-learning systems to support teaching and learning (Deng & Tavares, 2013; Islam, 2012a). The Learning Management System (LMS) is one such e-learning system that contains features for distributing courses over the Internet and online collaboration. It facilitates educator-to-student communication, tracking students' progress, and the secure sharing of course content online.

Nowadays, LMSs have become almost indispensable tools in education (Alvarez, Martin, Fernandez-Castro, & Urretavizcaya, 2013). Whether focusing on distance education or classroom-based education, most universities now use LMSs to support and improve learning and teaching processes. The implementation of LMSs by educational institutions has promised better quality and learner-centered education (Islam, 2012a).

The LMSs usually include a wide variety of features that can be utilized to support both distance and traditional teaching. LMSs have the potential to offer new learning and teaching methods that meet a variety of educational needs. For example, the use of the LMSs in university education has made it easy to offer hybrid courses to the students. A hybrid course is a blend of face-to-face classroom instruction with web-based learning (Alvarez et al., 2013; Woods, Jason, & Hopper, 2004). In such hybrid courses, educators combine the advantages of online learning with the benefits of face-to-face instruction. Woods et al. (2004) argue a mix of face-to-face and online instruction approach as superior to either a fully face-to-face or a fully online course as it offers students a more intellectually engaging learning experience. This approach also allows more flexibility for university administration in, for example, scheduling classrooms.

Adoption and use of e-learning systems has been one of the most researched topics in the prior literature (Islam, 2011; Sumak, Hericko, & Pusnik, 2011). Majority of these studies utilized the usage of e-learning systems as the final dependent variable and investigated its antecedents/determinants by applying the technology acceptance model (TAM) (Davis, 1989) and other complementary theories (see Islam, 2012a). A variety of factors were found to be antecedents/determinants of e-learning system usage in these studies. These factors include perceived ease of use (Sumak et al., 2011), perceived usefulness (Larsen, Sorebo, & Sorebo, 2009), perceived enjoyment (Lee, Cheung, & Chen, 2005), perceived playfulness (Roca & Gagne, 2008), information quality (Roca, Chiu, & Martinez, 2006), system quality (Islam, 2012a), service

quality (Roca et al., 2006), system functionality (Pituch & Lee, 2006), and self-efficacy (Teo, 2009). Perceived usefulness, and perceived ease of use were the most important drivers of e-learning adoption in most contexts (Sumak et al., 2011).

Prior research has been excellent at identifying antecedents/determinants of e-learning system adoption. However, the outcomes of e-learning system adoption and use have received a very little attention (Islam, 2012b; McGill & Klobas, 2009). Understanding the outcomes of e-learning system usage is important for evaluating the success of such systems, and for planning their future development in order to achieve better learning outcomes. Consequently, we investigate the outcomes of e-learning system usage for hybrid courses from the perspective of university students and attempt to answer the following research questions in this paper:

- *What factors constitute e-learning system adoption outcomes and how do these factors relate to each other?*
- *How do beliefs about usefulness and ease of use held by students, regarding an e-learning system, influence e-learning system adoption outcome related factors?*

The paper proceeds as follows. In Section 2 we present the literature review and research model. Section 3 is dedicated to the research method. Section 4 presents the data analysis results and discussion. Finally, Section 5 discusses the implications and limitations of the research.

2. Literature review and research model

2.1. E-learning adoption outcome research

Prior e-learning research has focused heavily on the adoption and post-adoption use of e-learning systems (e.g., Islam, 2011, 2012a; Roca et al., 2006; Sumak et al., 2011). Two schools of thought have been employed in this research stream. The first school implicitly views e-learning system post-adoption behavior as an extension of the e-learning system users' initial acceptance behavior, and uses the same set of variables to explain both acceptance and continued use (Cho, Cheng, & Lai, 2009; Lin, 2011). These studies have utilized TAM (Davis, 1989) as the main theoretical framework and extended it by using other complementary theories such as the theory of planned behavior (TPB) (Ajzen, 1991), self-determination theory (SDT) (Deci & Ryan, 1995), and unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) in order to investigate both e-learning adoption and continuance behavior. The second school has utilized the information systems (IS) continuance model (Bhattacherjee, 2001) as the main theoretical lens. To enrich this school, researchers have integrated other theoretical frameworks, such as the TAM (Davis, 1989), TPB (Ajzen, 1991), IS success model (DeLone & McLean, 2003), fairness theory (Lind, Kulik, Ambrose, & Deverapark, 1993), SDT (Deci & Ryan, 1995), attribution theory (Heider, 1958), and task-technology fit (Goodhue & Thompson, 1995) with the IS continuance model.

These studies mainly investigate the factors that affect the adoption and use of e-learning systems, but they do not consider how these factors, or the use of the e-learning system itself is associated with learning outcomes. Only a few studies have gone beyond use to explore the factors associated with learning. The studies and their key findings are reported in Table 1.

The studies in Table 1 provide some empirical support for the possible relationships between e-learning system use and e-learning system usage outcomes. However, these studies often used self-developed research models as the underlying theoretical lens. The studies have been conducted with a variety of outcome variables that use different explanatory variables and this has led to models that have weak link to theory in most cases (e.g., Liaw, 2008; Wan, Wang, & Haggerty, 2008). Consequently, this has made it difficult if not impossible to generalize from these research studies (McGill & Klobas, 2009). Thus, these studies fall short in explaining how the antecedents/determinants of e-learning system usage as well as the e-learning system usage itself influence e-learning system usage outcomes.

2.2. Conceptual framework development

TAM provides solid theoretical support for the relationships between adoption antecedents/determinants and behaviors (Davis, 1989) although it lacks theoretical support regarding the relationships between e-learning adoption behaviors and outcomes (Lee, Kozar, & Larsen,

Table 1
Research studies investigating e-learning system use outcomes.

Article	Theories used	Target population	Key findings
Lee and Lee (2008)	Self-developed model	Students on online courses	Satisfaction leads to better academic performance. Satisfaction is predicted by perceived usefulness, service quality, and information representation quality
Liaw (2008)	Self-developed model	Students on hybrid courses	Learner characteristics (self-efficacy and self-directedness) affect satisfaction. In turn, satisfaction, and usefulness affect continuance behavioral intention. E-learning effectiveness was found to have a high correlation with behavioral intention
Wan et al. (2008)	Self-developed	Students on online courses	ICT experience-related factors affect learning effectiveness and satisfaction through the mediation of virtual competency
McGill and Klobas (2009)	Task technology fit (Goodhue & Thompson, 1995)	Students on hybrid courses	Attitude, instructor norms and expected consequences affect e-learning use. Task-technology fit and e-learning system use affect perceived impact on learning. Finally, perceived impact on learning together with task-technology fit determine student grades
Chen (2010)	IS success model (DeLone & McLean, 2003)	Organization employees	Usage is predicted by perceived usefulness and user satisfaction. In turn, overall job outcome is predicted by usage
Hasanzadeh, Kanaani, and Elahi (2012)	IS success model (DeLone & McLean, 2003)	Educators, students and alumni	Goal achievements, the benefits of system use and loyalty to a system have been conceptualized as e-learning outcomes. System use had a direct influence only on loyalty to a system. Loyalty to a system had a high correlation with goal achievements