



Understanding the role of user resistance on mobile learning usage among university students



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ABSTRACT

This study examined the factors affecting university students' resistance and intention to use of mobile learning by developing an integrated research model that combines innovation diffusion theory (IDT) and model of innovation resistance (MIR). We added the concepts of inertia and innovativeness to shed light on the personal aspects of students' adoption of mobile learning. Data were collected from a self-administered online survey of South Korean university students ($N = 493$). Structural equation results revealed that relative advantage, complexity, and inertia had significant effects on students' mobile learning resistance, with inertia being the most significant. Relative advantage, innovativeness, and mobile learning resistance had significant effects on students' intention to use mobile learning, with relative advantage being the most significant. Furthermore, mobile learning resistance was found to mediate the effects of relative advantage and complexity on intention to use mobile learning. The results provide valuable implications for researchers and educational practitioners to develop and implement appropriate strategies for mobile learning.

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1. Introduction

Academic and practical interest in mobile learning as a specific type of learning model is increasing (Al-Emran, Elsherif, & Shaalan, 2016). Especially since mobile devices have become ubiquitous on university campuses, higher education has been regarded as the appropriate venue for the integration of student-centered mobile learning (Cheon, Lee, Crooks, & Song, 2012). Thus, strategic efforts are underway in various educational fields to activate the learning model in a mobile environment to include smart learning and ubiquitous learning (Fulantelli, Taibi, & Arrigo, 2015; Huang & Chiu, 2015).

Mobile learning is defined as “learning that occurs when learners have access to information anytime and anywhere via mobile technologies to perform authentic activities in the context of their learning” (Martin & Ertzberger, 2013, p. 77). Compared to the widespread use of smartphones in everyday life, mobile learning has not yet become a common learning method. Although many universities have offered to extend their existing web-based learning content to mobile services, students' interest and utilization of mobile learning has been less than expected (Hashemi, Azizinezhad, Najafi, & Nesari, 2011). Recent studies have also pointed out the restrictions and limitations of mobile devices as a learning tool (Briz-

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Ponce & Juanes-Méndez, 2016; Furió, Juan, Seguí, & Vivó, 2015; Mouza & Barrett-Greenly, 2015). These findings imply that careful and deeper understanding of students' reactions to mobile learning is required (Furió et al., 2015).

This study aims to identify the factors that affect university students' resistance to mobile learning and their intention to use it in a comprehensive and integrated manner. This study extends the previous literature on mobile learning in two aspects. First, prior studies have focused on predicting the adoption and satisfaction of mobile learning based on theories about the adoption paradigm, including the technology acceptance model (TAM) and innovation diffusion theory (IDT) (Cheon et al., 2012; Hashim, 2007). Despite the significant role of an individual's level of resistance for innovation (Kim & Kankanhalli, 2009), the effects of students' resistance to mobile learning and the factors that affect such resistance have seldom been investigated. In this study, both resistance and the use of mobile learning are investigated and the role of user resistance in mobile learning usage is examined.

Previous studies have also addressed the effects of the characteristics of new technology and innovation, which is a construct of IDT and the TAM. Drawing on these studies, this study enriches the discussion by adding individuals' psychological characteristics, as well as innovation characteristics that respond to changes as independent variables.

This study has a theoretical strength in that it integrates the IDT and model of innovation resistance (MIR) to identify the structural impact of innovation characteristics and personal characteristics on students' resistance and acceptance of mobile learning. In addition, this study provides valuable implications for researchers to develop appropriate strategies and for decision makers to implement practical and effective methods of mobile learning.

2. Literature review

2.1. Innovation diffusion theory

Explanations and predictions about consumers' adoption of new technology and the diffusion process have been subjects of great interest in both academia and the industrial world, and many related research models have been proposed. Among these, the most representative ones are IDT and TAM.

IDT, put forth by Rogers (2003), was developed by systematically organizing a variety of studies on innovation adoption. It has commonly been used in identifying the innovation adoption, diffusion process, and influence factors (Lee, Hsieh, & Hsu, 2011). Empirical studies have applied IDT to validate the effects of perception on innovation adoption for five innovation characteristics. An innovation's relative advantage, compatibility, trialability, and observability are well recognized in IDT, and a low perception of its complexity is associated with the rapid spread of innovation (Kleijnen, Lee, & Wetzels, 2009; Rogers, 2003).

Although the influence of innovation characteristics has been proven in many previous studies, the importance of each characteristic has not been adequately recognized at the same level, and the results have been mixed. The effects of trialability and observability have been dismissed in some studies, and the explanatory power of the relative advantage, complexity, and compatibility have been found to be relatively high (Lee et al., 2011; Tornatzky & Klein, 1982). Joo, Lim, and Lim (2014) examined the use of mobile learning by applying IDT and found that only the effects of relative advantage and complexity were significant among the five innovation characteristics. In particular, these two factors have been conceptually connected to the perceived usefulness and perceived ease of use, and have been presented as factors that affect technology acceptance in TAM (Davis, Bagozzi, & Warshaw, 1989). In extensive research in education and various other fields that have applied TAM, the perceived usefulness and perceived ease of use have been shown to be useful in predicting computer usage and adoption of new information technologies (Porter & Donthu, 2006).

The theory, IDT, describes innovativeness, a psychological characteristic of consumers, as another factor that can explain innovation adoption. Innovativeness is conceptualized as "venturesomeness" or variety-seeking and novelty-seeking in psychology and is regarded as the most distinctive consumer characteristic to explain innovation adoption (Rogers, 2003).

2.2. Model of innovation resistance

Theories on the adoption paradigm, including IDT and TAM, have established the intention to adopt or adoption as a dependent variable, and they focus on the variables that can positively affect such dependent variables. However, despite the considerable explanatory power of existing studies, there are accompanying fundamental limitations as these theories only consider the perspective of innovation adoption. One of the limitations is that the concept of adoption does not include a negative sense (Ram, 1987). For example, if the use intention is 1 on a 5-point scale, it means that the use intention is low not that the consumer will not adopt it; thus, it is difficult to identify if the negative responses are resentment or resistance, for example. The second limitation is that, in innovation, which generally means change, an existing method that provides a similar function exists as an alternative. Accordingly, the desire to adopt a new innovation as well as maintain the existing approach coexists for consumers (Garcia, Bardhi, & Friedrich, 2007); thus, we need to better understand the factors that affect resistance to innovation separately from innovation adoption.

MIR (Ram, 1987; Ram & Sheth, 1989) is a representative theory to which the resistance paradigm has been applied. Ram (1987, p. 208) defined innovation resistance as consumers' resistance to change when adopting an innovation. Ram (1987) presented the perceived innovation characteristics, consumer characteristics, and propagation mechanism as factors that affect innovation resistance. Variables of innovation characteristics were later revised so the variables that had been verified

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