Modelling tertiary students' flow experience in a mobile learning environment

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ABSTRACT

Mobile learning (m-learning) has gained increasing popularity with the advent of internet technology and ubiquity of mobile devices – these new technologies have enriched mobility in terms of students' engagement with learning seamlessly. Recently, the use of mobile devices for educationally related purposes has been on the increase among the tertiary students; due to the advancement recorded in the compatibility and interactive components of these mobile devices. The use of mobile devices among students for learning are common place on the campus and in the off-campus. It has been observed that students are usually so much engaged and immersed in their learning activities when using mobile devices. Therefore, it is increasingly important to evaluate how students' flow experience is enhanced and reinforced, from a combined perspective of the flow theory and technology acceptance model. This paper seeks to understand the impacts of perceived usefulness, perceived ease of use and attitude on students' flow experience and mobile learning acceptance. Insights from this study would enhance our understanding of the roles of flow experiences on mobile learning attitude and usage behaviour among tertiary students.

Keywords: Mobile learning, perceived ease of use, perceived usefulness, flow experience, technology acceptance model (TAM).

1. INTRODUCTION

Rapid technological advancement and explosion in the use of smart and handheld devices, especially tablets and smartphones have altered users' behaviour in different contexts. The impetus for these changes stemmed from ubiquitous innovation, superior multi-functional elements of the mobile devices, and the speed of internet broadband coupled with affordable pricing systems. Advances in mobile devices have impacted on the popularity of mobile learning as an integral part of an educational setting. Particularly, users of mobile learning have benefited from the dependence on mobile devices when fully engaged with learning activities.

Mobile learning occurs when learners engage in learning activities using devices without being constrained to a location. Mobile learning makes learning possible by removing the barriers of time and location. In other words, mobile learning is place specific Research has emphasized the application of mobile learning in a formal educational context based on the description that it involves ''the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning'' (Wong et al. 2015, p. 10). This opinion further affirms mobile learning as an educational provision with dominant handheld and palmtop devices (Park et al. 2012, p.592). Mobile learning is impressive because it aligns with the constructivist notion of self-directed learning which can take place outside of the classroom, anywhere and at any time. Several studies have investigated predictors of the intention to adopt mobile learning (Yeap et al. 2016; Park, 2009; Park etal. 2011; Park et al. 2008).

Nevertheless, an all-inclusive view which combines the flow experience dimensions of concentration, loss of self-consciousness, time distortion, and autotelic experience and Technology Acceptance Model (TAM) perspectives could further our understanding of how using mobile learning is influenced among tertiary students. While students flow experience has been validated in other contexts, such as game-based classroom settings (Hamari et al. 2016; Kiili et al. 2014) and e-learning environment (Esteban-Millat et al. 2014), researchers are yet to investigate this concept in the context of its link with TAM based constructs. Specifically, the link between perceived ease-of-use and perceived usefulness and flow experience of users in the mobile learning context is yet unearthed by researchers. Given the dearth of knowledge of this issues the aim of this study to understand the impact of flow experience on mobile learning usage among the tertiary students. To achieve this aim, this study proposes a conceptual model that draws from the Flow theory (Csikszentmihalyi 1975) and Technology acceptance model (Davis 1989). In accordance with the above; perceived usefulness, perceived ease-of-use attitude are proposed as predictors of flow experience which is the construct of interest in this research model.

2. THEORETICAL DEVELOPMENT

The Flow Theory (Csikszentmihalyi 1975) suggests that people felt rewarded by executing actions and experience high enjoyment and fulfilment from such activity, such optimal experience connotes "flow". Flow represents an individual's state of autotelic experience in an activity that is perceived to be intrinsically rewarding. In the context of mobile learning; flow experience is an optimal experience about an activity, which is characterised by a match between perceived challenges and perceived skills (Csikszentmihalyi 1975) is adopted to explain users' experience about using mobile learning among tertiary students. By extension, this research

framework further argues that flow, as a psychological factor affects actions through immersion and user full involvement.

Technology acceptance model (Davis 1989) explains the use of information technology to accomplish task performance in different task context. Specifically, technology acceptance describes the desire of a user to accept and adopt a specific technology for the task that it can support. Technology acceptance model (TAM) has been widely used to explicate usage behaviours in the information systems (IS) area. TAM took its roots from the Theory of Reasoned Action (Fishbein and Ajzen 1975) and postulates that perceived usefulness and perceived ease-of-use predicts adoption attitude in an IS environment. TAM has been used severally in the investigation of new information systems and technology adoption. Similarly, research in the educational sector has used TAM to explain the adoption of learning systems (Park, 2009; Park et al. 2008). TAM is suitable for analysing learner's behaviour in a mobile learning context because mobile learning is mediated by mobile technological devices.

This study extends TAM by incorporating Flow theory into this proposed research framework. This conceptual model suggests that perceived usefulness and perceived ease of use will influence users' flow experience and attitudes towards the technology and subsequent usage of the mobile learning.

2.1 Flow experience

Flow experience is a holistic sensation that people feel when they act with total involvement (Csikszentmihalyi 1975). Flow is a motivational state of autotelic experience in a course of action that is perceived to be intrinsically satisfying.

Flow explains individual's feelings in an activity context, taking into consideration the link between the task or activity and the capability or skills possessed by the individual (Csikszentmihalyi 1975; Csikszentmihalyi and LeFevre 1989). The state of flow occurs when an individual is partaking in an activity for its own sake; the state is so satisfying that individuals want to repeat the activity continually. The state of flow makes people go into a common mode of experience and a state of absorption.

Flow state comprises the following dimensions, including clear goals, immediate feedback, potential control, the merger of action and awareness, personal skills well suited to given challenges, concentration, loss of self-consciousness, time distortion, and autotelic experience (Csikszentmihalyi 1975). People experience flow when they are in control of the activity, and such activities may include such as sports, work, shopping, rock climbing, dancing, games and others (Csikszentmihalyi and LeFevre 1989). Agarwal and Karahanna (2000) argues that individual behaviour towards new information technologies is shaped by holistic experiences with the technology. The IS setting shows that facilitating flow or optimal experiences or enjoyment in an activity can lead to positive outcomes (Esteban-Millat et al. 2014).

Recently, the flow experience construct was used to explain total involvement and experience of users in information and computer mediated environment (Choi et al. 2007) and was found to significantly affect learning attitude and learning outcomes both in a direct way and in an indirect way in an e-learning context (Choi et al. 2007). The IS context shows that flow experience affects exploratory behaviour, enjoyment, satisfaction and acceptance of information technology (Agarwal and Karahanna 2000). Similarly, Csikszentmihalyi and LeFevre (1989) confirmed the relationship between flow and learning performance. The notion that when a person perceives his/her skills of doing a course of action is high in meeting the given challenges, such a person should develop a positive perception of flow experience. The development of the flow experience will be influence by perceived ease of use, perceived usefulness and positive mobile learning attitude and subsequent mobile learning use intention. Flow experience encapsulates, enjoyment, concentration, involvement and absorption in an activity; and concentration involves focused attention on an experience. Therefore, the state of conspicuous absorption in the useofa mobile device will increase users' positive mobile learning attitudes and continuous mobile learning usage. Research findings confirmed that; flow experience affects e-learning attitude and learning outcomes and satisfaction (Choi et al. 2007; Buil et al. 2017).

Zha et al. (2015) reported a difference in the mean of flow experience in the usage of mobile libraries and web digital libraries. Liu et al. (2009) also indicate that users' concentration (flow state) tends to be positively significant with their intention to use the technology. However, users' concentration state is negatively correlated with the intention to use the technology in a media-rich presentation. Accordingly, the following propositions are put forward;

- Proposition 1: Flow experience is positively related to mobile learning attitude
- Proposition 2: Flow experience is positively related to mobile learning use

2.2 Attitude

Attitude is the degree to which performance of a behaviour is positively or negatively valued in terms of the beliefs surrounding the prospective consequences from such behavioural performance (Ajzen 1991). Ajzen argues that planned behaviour or behavioural performance is determined by an individual attitude and beliefs concerning the outcomes.

In the context of mobile learning; attitude towards mobile learning (m-learning) connotes the degree to which a person has a positive and negative feeling about using mobile devices for learning. Several studies have corroborated Ajzen's argument on the impact of attitudes on behavioural performance, especially the behavioural intention to adopt and use a new technology (Ajzen 1991).

- Proposition 3: Attitude is positively related to mobile learning use.

2.3 Perceived usefulness

Perceived usefulness captures the extent to which a potential adopter views the target technology as offering better value over alternative methods of carrying out the same task (Davis 1989). Park (2009) tested the influence of perceived usefulness and reported that perceived usefulness affects students' attitudes towards the use of learning systems. It was equally reported that PU had direct and indirect relationships with students' behavioural intention to use e-learning.

Park et al. (2011) found a positive relationship between perceived usefulness and mobile learning attitudes and a negative relationship between PU and behavioural intention. Yeap, Ramayah and Soto-Acosta (2016) tested the relationship between perceived usefulness and students' learning attitude, the finding shows a positive correlation between the variables. In fact, perceived usefulness and perceived ease of use explained 57.2% of the variance in attitude. Perceived usefulness as an analogy of performance expectancy is recommended to be able to influence users' intention to use library mobile applications (Chang 2013). It is evident that research are inconsistent in their findings, thereby suggesting for a new research framework that will better explain the motivations of students on the use of mobile learning technology.

- Proposition 4: Perceived usefulness is positively related to flow experience.

- Proposition 5: Perceived usefulness is positively related to mobile learning attitude.

2.4 Perceived ease-of-use

Perceive ease-of-use is the degree to which a potential adopter views the usage of the target technology to be relatively free of effort (Davis 1989). The constructs encapsulate the degree to which a person believes that using a system would be free of effort. Research has reported that perceived ease of use influence students' attitudes in a learning environment (Park 2009). Equally, that perceived ease of use was found to have direct and indirect relationships with behavioural intention in an e-learning environment. Yeap et al. (2016) found a positive relationship between perceived ease of use and attitudes towards learning. Ease-of-use which is tantamount to effort expectancy has been empirically validated as determinants of mobile application intentional use (Chang 2013).

Choi et al. (2007) argued that a learner's perception of an easy to use learner interface represents a linkage between person-artefact interactions. In addition, research has confirmed that perceived ease of use of a system influence users' attitude towards using the system (Davis, 1989). It was further argued that easy to use interface affects flow and learning attitudes in a learning context. The empirical finding shows that easy to use technology interface affects attitudes and students' flow experience in e-learning situations. Based on the afore mentioned, it is proposed that;

- Proposition 6: Perceived ease-of-use is positively related to flow experience.
- Proposition 7: Perceived ease-of-use is positively related to mobile learning attitude.

instrument can be measured on 5-point Likert scales. Students' respondents from a tertiary institution are suitable for this type of study. Qualified respondent might have being a prior user of one form of device for learning purpose. The structural equation modeling (SEM) analytic approach is best suited for the test of this research model. SEM is reliable in analysing latent variables and it also takes care of the problem of factor indeterminacy. SEM is appropriate for this study because it can evaluate the measurement and structural models simultaneously.

4. CONTRIBUTION AND CONCLUSION

One of the highlights of this paper is that mobile learning adoption among tertiary students can be influenced by students' flow experience and learning attitude towards the mobile learning device. However, to influence the flow state, the model operationalised perceived usefulness, and perceived ease-of-use as core determinants of flow state. Consequently, the flow experience of the users is projected to affect the mobile learning attitude and effective use of mobile devices for learning purposes. In all, the research model indicates that flow experience and mobile learning attitude will affect mobile learning usage.

This study contributes to the body of literature, particularly, how flow experience influences mobile learning usage among tertiary students. The combined view of TAM and Flow theory may provide useful insights on how mobile learning can be stimulated by practitioners in this area. In addition, the insight from this paper provides useful tips on the use of mobile learning for tertiary students because the understanding of these variables can promote attitude and stimulate the adoption

Figure 1: Conceptual model
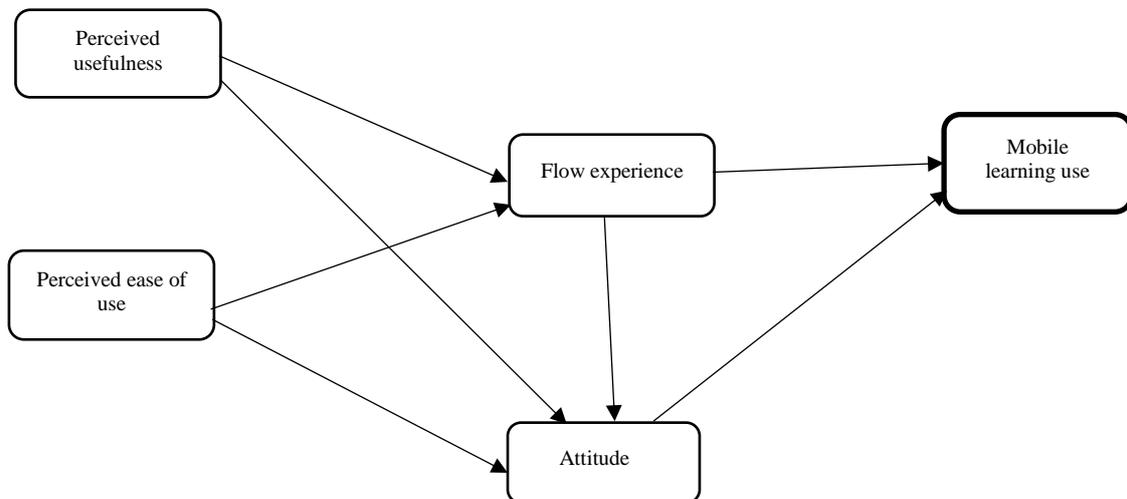
3. CURRENT RESEARCH DIRECTION

Several research models in mobile learning adoption using the flow experience are focused on game-based classroom settings (Hamari et al. 2016; Kiili et al. 2014) and e-learning environment (Esteban-Millat et al. 2014). Researchers have neglected studies using a framework consisting of TAM and flow theories in their investigation. For instance, we are yet to see the context of TAM based constructs and the links between perceived ease-of-use and perceived usefulness on flow experience of students in a learning environment. Given the sparse attention on these variables and dearth of investigation on the relationships between TAM and flow will provide a new insight on how mobile learning could be enhanced in a learning environment.

This research framework could be measured using a survey drawn from previous validated scales in this area. Such survey

intention of mobile technologies among the tertiary institutions. This research model provides new direction for future studies to researchers who might want to validate and expand the ideas in this paper by adopting or adapting this conceptual model.

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