

## **Extending the Technology Acceptance Model (TAM) to assess Students' Behavioural Intentions to adopt an e-Learning System: The Case of Moodle as a Learning Tool**

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### **Abstract**

*Universities are implementing e-learning systems to improve the learning-teaching process. However, when an e-learning system is implemented, it needs to be adopted by its users, and the acceptance and adoption of this e-learning system will be influenced and determined by different factors. The aim of this study is to assess the factors that influence university students' intention to use an e-learning system and use Moodle as the exemplar case. An extended version of the technology acceptance model (TAM) was used in this study as its theory base. Data was collected from 515 students from a private university in the State of Kuwait. Partial least squares (PLS) of structure equation modelling (SEM) technique was used to analyze the data. The study results showed that the variables perceived credibility, satisfaction, subjective norm, self-efficacy, perceived ease of use, perceived usefulness and attitude positively affecting the intention to use the e-learning system Moodle. It is believed that this research is to be the first to find empirical support for these relationships in the Kuwaiti context. Additionally, different from most of the studies that consider western countries, this study supports TAM's reliability and validity in an educational context in the Middle East region and more specifically in Kuwait.*

*Keywords: Adoption, e-learning, Kuwait, Moodle, Technology Acceptance, TAM*

## 1.0 INTRODUCTION

The advancement of different technologies provides instructors with many interesting tools that can be used to improve the teaching–learning process. As a result, universities are investing considerable resources in e-learning systems to support teaching and learning (Deng & Tavares, 2013; Islam, 2012). The usefulness of these tools makes important for universities and instructors to have more information about the advantages and possibilities of adopting these technologies (Kaminski, 2005), as well as about the results derived from their application (Martín-Blas & Serrano-Fernández, 2009). The Learning Management System (LMS) is one such e-learning system that facilitates educator-to-student communication, tracking students' progress, and the secure sharing of course content online (Martín-Blas & Serrano-Fernández, 2009).

Moodle (Modular Object-Oriented Dynamic Learning Environment), a well-known Learning Management System (LMS), is an open source that enables teachers to create their dynamic, effective online learning sites for students (Hsu, 2012). According to Ellis (2009), a robust LMS should contain several functions such as automate administration, self-service and self-guided services, rapid assembly and delivery of learning content, a scalable web-based platform, portability and standard support, and knowledge reuse. For instance, LMS is a system that provides services that are necessary for handling all aspects of a course through a single, intuitive and consistent web interface. Such services are, for example: (1) course content management, (2) synchronous and asynchronous communication, (3) the uploading of content, (4) the return of students' work, (5) peer assessment, (6) student administration, (7) the collection and organization of students' grades, (8) online questionnaires, (9) online quizzes, (10) tracking tools, etc (Sumak et al., 2011). Moodle offers these advanced and user-friendly functions for encouraging the collaborative work of students and teachers (Hsu, 2012).

Weitzman et al. (2006) provided a specific guide in relation to the factors that must be taken into account before institutionalizing a tool like Moodle: (1) defining its purpose: The universities and high education institutions need to explicitly inform both teacher Educators and graduate students (i.e. in written form) about the Moodle platform: i.e., guidelines and protocols on how to use Moodle (i.e., criteria for uploading documents or designing quizzes or questionnaires), (2) collecting information about its users, (3) generating a list of suggestions based on the feedback obtained in steps 1 and 2: The universities have to conduct preliminary studies to know the potential users', opinions and suggestions (4) carrying out research that show its benefits (collecting empirical evidences), and (5) choosing and implementing the tool (according to collected research evidences). Recently, researchers have found that the models and theories that emerged from the body of research within the business contexts could be applied to understanding technology acceptance in educational contexts (Teo, 2013). Among the most popular models in technology acceptance research, the technology acceptance model (TAM) (Davis, 1989) has been found to be a robust and parsimonious model for understanding the factors that affect users' intention to use technology in education (Teo, 2011, 2012). TAM has become one of the most widely used models in technology embedded education research (Kılıç, 2014). What makes the TAM model widespread is its understand-ability and simplicity (King & He, 2006).

This study adopted a modified version of the Technology Acceptance Model (TAM) to investigate factors that determine the adoption of e-Learning systems among university students in Kuwait and use Moodle as a teaching tool exemplar. To the best of our knowledge, this is the first paper that addresses this issue in the Middle East region and specifically in the State of Kuwait. The main research question of this paper is: *What are the main factors that determine university students' attitudes toward the adoption of e-Learning systems?* It is believed that the findings of this study consolidate steps 3 and 4 of Weitzman's et al. (2006) guidelines.

The paper is structured as follows. Following the Introduction, Section 2 provides (a) a brief background of technology acceptance and adoption, (b) an abbreviated past research on technology adoption in education, and (c) an overview Moodle, the exemplar teaching tool investigated in this study; Section 3 discusses the research model and hypotheses development; Section 4 explains the

research method; Section 5 presents the research results; and Section 6 summarises the hypothesis testing; followed by the research conclusions, limitations and future research in section 7.

## 2.0 LITERATURE REVIEW

### 2.1 *Technology Acceptance and Adoption*

Researchers in the field of Information Systems (IS) have for long been interested in investigating the theories and models that have the power in predicting and explaining behaviour (Venkatesh *et al.*, 2003). Various models were developed, such as the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), Innovation Diffusion Theory (IDT) Rogers (1962, 1995), Theory of Planned Behaviour (TPB) (Ajzen, 1991), Diffusion of Innovation (DOI) Rogers (1995) and Technology Acceptance Model (TAM) (Davis, 1986). Each model has its own independent and dependent variables for user acceptance and there are some overlaps. However, most of the IT adoption works conducted earlier had adopted the technology acceptance model (TAM) to examine the user's intention for acceptance of technology. In their study of a total of 500 survey questionnaires, Adensina and Ayo (2010) found that TAM is the most widely used model for technology adoption.

TAM was developed by Davis (1986) to theorize the usage behavior of computer technology. The TAM was adopted from another popular theory called theory of reasoned action (TRA) from field of social psychology which explains a person's behavior through their intentions. Intention in turn is determined by two constructs: individual attitudes toward the behavior and social norms or the belief that specific individuals or a specific group would approve or disprove of the behavior. While TRA was theorized to explain general human behavior, TAM specifically explained the determinants of computer acceptance that are general and capable of explaining user behavior across a broad range of end-user computing technologies and the user population (Davis, Bagozzi & Warshaw, 1989). TAM breaks down the TRA's attitude construct into two constructs: perceived usefulness (PU) and perceived ease of use (EU) to explain computer usage behavior. In fact, TAM proposes specifically to explain the determinants of information technology enduser's behavior towards information technology (Saade, Nebebe & Tan, 2007). In TAM, Davis (1989) proposes that the influence of external variables on intention is mediated by perceived ease of use (PEU) and perceived usefulness (PU). TAM also suggests that intention is directly related to actual usage behavior (Davis *et al.*, 1989).

While TAM has received extensive support through validations, applications and replications for its power to predict use of IS and is considered to be the most robust and influential model explaining IS adoption behaviour (Davis, 1989; Davis *et al.*, 1989; Lu *et al.*, 2003), it has been found that TAM excludes some important sources of variance and does not consider challenges such as time or money constraints as factors that would prevent an individual from using an information system (Al-Shafi and Weerakkody, 2009). In addition, TAM has failed to provide meaningful information about the user acceptance of a particular technology due to its generality (Mathieson *et al.*, 2001). Davis *et al.*, (1989) compared the TAM with TRA in their study. The confluence of TAM and TRA led to a structure based on only three theoretical constructs: behaviour intention (BI), perceived usefulness (PU) and perceived ease of use (PEOU). Social norms (SN) were found to be weak as an important determinant of behavioural intention. While TRA and TPB theorised social norms as an important determinant of behavioural intention, TAM does not include the social norms as such, influence of social and control factors on behaviour. This is significant, as the model will miss a core and critical component of technology acceptance, as these factors are found to have a significant influence on IT usage behaviour (Mathieson, 1991; Taylor & Todd, 1995) and indeed are important determinants of behaviour in the TPB (Ajzen, 1991).

For instance, researchers have found that original TAM variables may not adequately capture key beliefs that influence consumer attitudes toward e-commerce, for example, (Pavlou, 2003). As a result, TAM has been revised in many studies to fit a particular context of technology being investigated. One important and well-received revision of TAM has been the inclusion of social influence processes in predicting the usage behavior of a new technology by its users (Venkatesh and Davis, 2000). Legris *et al.* (2003) suggested that TAM deserves to be extended, by integrating

additional factors, to facilitate the explanation of more than 40 percent of technology acceptance and usage. Other studies (e.g. Sun & Zhang, 2006; Thompson et al., 2006) have suggested to extension and refinement of the technology acceptance models to enhance its generalizability. Thompson et al. (2006) argued that, considering the evolving new technologies, perceived ease of use and perceived usefulness are not the only suitable constructs that determine technology acceptance. Moreover, Agarwal and Prasad (1998) stated that, including more dimensions, with other IT acceptance models in order to enhance its specificity and explanatory utility, would perform better for a particular context.

Venkatesh and Davis (2000) extended the original TAM model to explain perceived usefulness and usage intention in terms of social influence (e.g., subjective norms, voluntariness) and cognitive instrumental processes (e.g., job relevance, output quality). The extended model is referred to as TAM2. Later, Venkatesh et al. (2003) adopted a new model, the Unified theory of Acceptance and Use of Technology (UTAUT), which incorporates constructs from a number of other IT adoption theories/models. UTAUT was developed as a result of a review and synthesis of eight theories and models of IT adoption (Venkatesh et al., 2012). Since its original publication, UTAUT has been applied to the study of a variety of IT applications in both organizational and non-organizational settings that have contributed to fortifying its generalizability (Venkatesh et al., 2012).

UTAUT was developed as a result of a review and synthesis of eight theories and models of IT adoption (Venkatesh et al., 2012). UTAUT comprise of four predictors of users' behavioral intention and behavior of use; these four factors are performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003). Four key factors moderate the relationships between these constructs, behavior intention and behavior of use namely age, gender, voluntariness and experience (Venkatesh et al., 2003). The model has been shown to explain up to 70 percent of variance in intention to use technology, outperforming each of the aforementioned specified models; therefore, it has been argued that the UTAUT model should serve as a benchmark for the acceptance literature (Venkatesh et al., 2003).

Since its original publication, UTAUT has been applied to the study of a variety of IT applications in both organizational and non-organizational settings that have contributed to fortifying its generalizability (Venkatesh et al., 2012). For instance, The UTAUT model has been adopted by many studies either partially or wholly and confirmed its validity and reliability in different situations and contexts (e.g. Khan et al., 2011; Slade, Williams and Dwivedi, 2013). It should be noted though, that the application of UTAUT as raised a number of concerns in relation to its applicability in non-Western countries (e.g. Al-Qeisi et al., 2015).

## **2.2 Technology Acceptance and Adoption in Education**

Recently, various papers have been published on the context of application of TAM in the higher education context (e.g. Teo, 2009, 2010, 2011a, 2011b). A number of studies have used TAM to examine learners' willingness to accept e-learning systems (e.g., Al-Adwan et al., 2013; Shah et al., 2013; Sharma and Chandel, 2013; Shroff et al., 2011; Tabak and Nguyen, 2013) or to predict learners' intentions to use an online learning community (Liu et al., 2010). Some papers focused on validating TAM on a specific software which is applied in higher education. For example, Escobar-Rodriguez and Monge-Lozano (2012) use TAM for explaining or predicting university students' acceptance of Moodle platform, while Hsu et al. (2009) performed an empirical study to analyze the adoption of statistical software among online MBA students in Taiwan. While some studies report that perceived usefulness and perceived ease of use impact attitude toward technology use and behavioral intention to use technology (e.g. Rasimah et al., 2011; Teo, 2011; Sumak et al., 2011), Grandon et al. (2005) argued that e-learning self-efficacy was found to have indirect effect on students' intentions through perceived ease of use. Also, Mungania and Reio (2005) found a significant relationship between dispositional barriers and e-learning self-efficacy. They argued that educational practitioners should take into consideration the learners' dispositions and find ways through which e-learning self-efficacy could be improved.

Dasgupta et al. (2002) analyzed the acceptance of a courseware management technology (e-collaboration tool) by undergraduate students. They found that user level is a significant determinant

of the use of this technology. Also, Selim (2003) investigated TAM with web-based learning. The author proposed the course website acceptance model (CWAM) and tested the relationships among perceived usefulness, perceived ease of use and intention to use with university students. The results of his study indicated that the model fits the collected data. Additionally, Selim argued that usefulness and ease of use are significant determinants of the acceptance and use of the course website. By integrating TAM with motivational theory, Lee et al. (2005) studied university students' adoption behavior towards an Internet-based learning medium (ILM) introducing TAM. The authors included perceived enjoyment as an intrinsic motivator in addition to perceived usefulness and perceived ease of use. The results indicated that perceived usefulness and perceived enjoyment had an impact on both students' attitude toward and intention to use ILM. However, perceived ease of use was found to be unrelated to attitude.

Phuangthong and Malisawan (2005) argued that TAM was helpful to understand factors affecting mobile learning adoption with 3<sup>rd</sup> generation mobile telecommunication (3G) technology. Drennan et al. (2005) examined the factors affecting student satisfaction with flexible online learning and identified two key student attributes of student satisfaction: positive perceptions of technology in terms of ease of access and use of online flexible learning material and autonomous and innovative learning styles. Additionally, Dikbaş et al. (2006) examined the perceptions of teachers in relation to using technology in classrooms. The authors found that perceived ease of use and perceived usefulness are important predictors of effective technology use. Elwood et al. (2006) investigated students' perceptions on laptop initiative in higher education. They found that the external factor "perceived change" is relevant to understand the technology acceptance within the university environment.

Ngai et al. (2007) investigated the factors that influence WebCT use in higher education institutions in Hong Kong, using the TAM model. They extended the model to include a new factor "technical support". The results revealed that technical support is an important direct factor in the feeling that the system is easy to use and is useful. Moreover, using the extended TAM2, Van Raaij and Schepers (2008) researched the acceptance and usage of a virtual learning environment in China and the results indicated that perceived usefulness has a direct effect on the use of virtual learning environments (VLE). Perceived ease of use and subjective norms only had an indirect effect via perceived usefulness. It was also demonstrated that new variables related to personality traits, like being innovative and feelings of anxiety towards the computer, had a direct effect on perceived ease of use. Gibson et al. (2008) studied the degree to which TAM was able to adequately explain faculty acceptance of online education. Results indicate that perceived usefulness is a strong indicator of faculty acceptance; however, perceived ease of use offers little additional predictive power beyond that contributed by perceived usefulness of online education technology.

Using UTAUT, Jairak et al. (2009) confirmed that the unified theory of acceptance and use of technology was able to explain university students' mobile learning acceptance. They argued that the university administration should emphasize a well fit design mobile learning system that is appropriate with student's perception. Moreover, Shen and Eder (2009) examined students' intentions to use the virtual world Second Life for education, and investigated factors associated with their intentions. Results suggested that perceived ease of use affects user's intention to adopt Second Life through perceived usefulness. Computer self-efficacy and computer playfulness were also significant antecedents to perceived ease of use of virtual worlds. Based on TAM, Teo (2009) investigated teacher candidates in Singapore. The study found that technology acceptance of teachers increased their effective technology use in their classes. Additionally, Al-hawari and Mouakket (2010) analyzed the significance of TAM factors in the light of some external factors on students' e-retention and the mediating role of e-satisfaction within e-learning context. They found significant relationships between these factors and indicated that further testing across different countries is needed to identify other external factor that might influence IT acceptance. Also, Waheed and Jam (2010) tested the teacher's acceptance of implementing web-based learning environment based on TAM. The results of the study support that teachers are accepting to implement the new virtual based learning system for better productivity of teachers, students and institution.

Sumak et al. (2011) found that perceived usefulness and perceived ease of use were factors that directly affected students' attitude, and perceived usefulness was the strongest and most significant determinant of students' attitude toward using technology in learning, while Wu and Gao (2011) identified perceived enjoyment as a factor in predicting attitude and behavioral intentions to the use of clickers in student learning. Based on TAM, Wong et al. (2012) explored the role of gender and computer teaching efficacy as external variables in technology acceptance in Malaysia. The authors found that TAM was adequately explained by the data. The model accounted for 36.8 percent of the variance in intention to use computers among student teachers.

### 2.3 Moodle

Moodle has been used as a LMS platform for sharing useful information, documentation, and knowledge management in research projects; yielding important benefits to the researchers (Uribe-Tirado et al., 2007). In fact, one of the most used LMS is Moodle, an open source based on pedagogical principles (Goyal & Puhorit, 2010) that incorporates several multimedia resources to manage content lessons (Moodle, 2007). One reason that may have contributed to this is that Moodle does not emerge from the engineering context but, on the contrary, it has an educational background (Cole & Foster, 2007).

Peat and Franklin (2002) argue that the wide spread of using Moodle is contributed to not only for its technical applications but for the promotion of new learning among students since it facilitates an organized display of the material. For instance, Moodle, as a teaching tool, allows for (a) *The management of subject contents (documents, graphics, web pages or videos)*; (b) *Communication with students* (i.e. forums or virtual tutorials) and (c) *Students' assessment* (i.e. grading or monitoring subject assignments) (Susana et al., 2015, p: 605).

Additionally, Moodle complements teachers' face-to-face teaching. Martín-Blas and Serrano-Fernández (2009) argued that instructors can also improve Moodle platform by implementing web-based peer assessment. The authors stated that these works are used to enhance the student cognitive schema, helping them to construct their knowledge, and promoting the student positive attitudes towards discussing and cooperating with peers. It is evidenced that students increase their skills to undertake learning by using the information technology.

Martín-Blas and Serrano-Fernández (2009) claimed that Moodle has become established as an online tool that allows the use of graphics, forums, chat, databases, quizzes, survey, wikis, web pages, video transmissions, and Java and Active X technologies to reinforce lessons. Additionally, Moodle is expanding its use to cloud computing and mobile learning (Wang et al., 2014).

Susana et al. (2015, p: 605) argued that Moodle has three characteristics:

1. *Interaction*. It enhances student-student discussions (Picciano, 2002). Beaudoin (2001) found that students reported increased satisfaction for online courses.
2. *Usability*. It has a variety of useful options for students such as easy installation (Katsamani et al., 2012), customization of the options (Sommerville, 2004), security and management (Chavan & Pavri, 2004), easiness of navigation; software attractiveness and users' satisfaction (Kirner & Saraiva, 2007).

*Social presence*. Moodle promotes a sense of community in online courses (Sagun & Demirkan, 2009). Social presence is an essential aspect in any educational experience referring to participants' perception on the degree they see others as true speakers in mediated communication (Gunawardena & Zittle, 1997). It has been demonstrated to be a relevant predictor of students' perceived learning (Richardson & Swan, 2003).

## 3.0 RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

The research model of this study is presented in Figure 1.

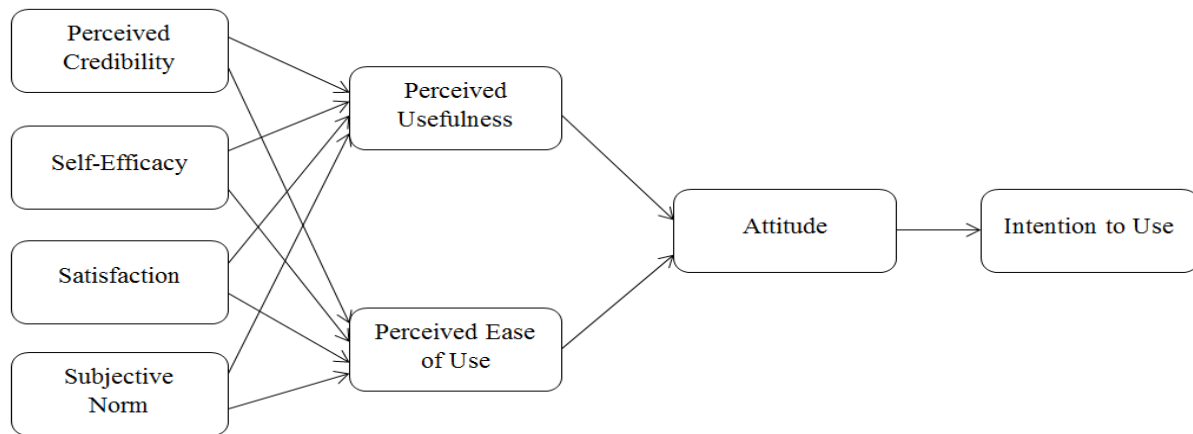


Figure 1. The Research Model

### **Perceived Credibility (PC)**

In this study, perceived credibility (PC) designates the perception of protection of students' transaction details and personal data against illegal entrance. According to Hanudin (2007), perceived credibility is a key indicator of behavioral intention to use an IS. Perceived credibility refers to two important dimensions which are security and privacy. Security is defined as the protection of information or systems from unsanctioned intrusions or outflows, while privacy is the protection of various types of data that are collected (with or without the knowledge of the users) during users' interactions with the internet (Hoffman et al., 1999). Oni and Ayo (2010) tested empirically and proved that Perceived Credibility (PC) have positive impact on Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Nysveen et al, (2005) also found perceived credibility had a significant effect on intention. The usage intention (i.e. attitude towards using Moodle) could be affected by students' perceptions of credibility regarding security and privacy issues. Thus, to study the effect of perceived credibility on students' acceptance of using Moodle, the study makes the following hypotheses:

*H1: Perceived credibility has a significant effect on perceived ease of use.*

*H2: Perceived credibility has a significant effect on perceived usefulness.*

### **Self-Efficacy (SE)**

Self-efficacy is one's belief in his or her ability to execute a particular task or behavior (Bandura, 1986). Venkatesh and Davis (1996) found that SE acts as a determinant of perceived ease of use both before and after hands-on use with a system (Venkatesh & Davis, 1996). SE is considered as one of the external variable in TAM model and it plays a vital role in shaping an individual's feeling and behaviour (Compeau & Higgins, 1995). Research on self-efficacy has found to be a significant predictor of perceived usefulness and perceived ease of use (e.g., Hsu et al. 2009; Macharia and Pelsler 2012; Padilla-Melendez et al. 2008).

Eastin (2002) revealed that SE has a significant impact on customer attitude and played important role in the e-commerce adoption processes. Also, Hanudin (2007) found that there is a causal link between SE and perceived ease of use. In fact, SE would lead to more favourable behavioural intention through its influence on perceived usefulness and perceived ease of use (Wang et al., 2003 and Pikkarainen et al., 2004). Mungania and Reio (2005) found a significant relationship between dispositional barriers and e-learning self-efficacy. The authors argued that educational practitioners should take into consideration the learners' dispositions and find ways to improve students' self-efficacy. In their study, Grandon et al. (2005) found that e-learning self-efficacy have indirect effect on students' intentions through perceived ease of use. Other TAM researchers have found an influence of SE on different TAM variables (Chen et al., 2002; Downey, 2006; Strong et al., 2006, Saade and Kira, 2009). As a result, this study hypothesizes the following:

*H3: Self-efficacy has a significant effect on perceived ease of use.*

*H4: Self-efficacy has a significant effect on perceived usefulness.*

### **Subjective Norm (SN)**

Subjective norm, one of the social influence variables, refers to the perceived social pressure to perform or not to perform the behavior (Ajzen, 1991). SN is defined as the person's perception that most people who are important to him or her think he or she should or should not perform the behaviour in question (Davis, 1989). SN was adopted and included in the TAM model, in order to overcome the limitation of TAM in measuring the influence of social environments (Venkatesh and Davis, 2000). Whether this is positive or negative; it is a very important factor in many aspects of the lives of citizens and is likely to be influential (Venkatesh *et al.*, 2003). It is believed that, in some cases, people might use a system to comply with the mandates of others rather than their own feelings and beliefs (Davis, 1989).

From the theory of planned behaviour (Ajzen, 1991) and unified theory of acceptance and use of technology (Venkatesh *et al.*, 2003) subjective norm (or social influence) was hypothesised to have a direct effect on behavioural intention and perceived usefulness. Venkatesh and Davis (2000) argued that when a co-worker thought that the system was useful, a person was likely to have the same idea. It is argued that people can choose to perform a specific behaviour even if they are not positive towards the behaviour or its consequences, depending on how important they think that the important referents believe that they should act in a certain way (Fishbein & Ajzen 1975; Venkatesh & Davis 2000). This was supported by Schepers and Wetzels (2007), who meta-analysed 88 studies on the relationship between subjective norm and the TAM variables. They found overwhelming evidence that showed a significant relationship between subjective norm and perceived usefulness, and subjective norm and intention to use.

In their study, Grandon *et al.* (2005) found subjective norm to be a significant factor in affecting university students' intention to use e-learning. Findings of many scholars (e.g. Rogers, 1995; Taylor & Todd, 1995; Lu *et al.*, 2003; Pavlou *et al.*, 2003) suggest that social influence is an important determinant of behaviour. Hence, this study hypothesizes the following:

*H5: Subjective norm has a significant effect on perceived ease of use.*

*H6: Subjective norm has a significant effect on perceived usefulness.*

### **Satisfaction**

Student satisfaction is an important indicator of the quality of learning experiences students received (Yukselturk & Yildirim, 2008). Hence, it is valuable to investigate students' satisfaction with different technology used in the learning and teaching process, as new technologies have altered the way that students interact with instructors and classmates (Kaminski *et al.*, 2009). Satisfaction in a given situation is a person's feelings or attitudes toward a variety of factors affecting that situation (Wixom and Todd, 2005). As articulated in the theory of reasoned action (TRA), these relationships will be predictive of behavior when the attitude and belief factors are specified in a manner consistent with the behavior to be explained in terms of time, target, and context (Fazio & Olson, 2003).

In this paper, we follow the same notation of Wixom and Todd (2005, p: 90) in relation to satisfaction, where satisfaction with the system will influence perceptions of usefulness. That is, the higher the overall satisfaction with the system, the more likely one will find the application of that system useful in enhancing his/her work performance. Additionally, the authors argued that satisfaction represents a degree of favourableness with respect to the system and the mechanics of interaction. That is, the more satisfied one is with the system itself, the more likely one is to find the system to be easy to use. The authors argued that influences of object-based attitudes on behavioural beliefs are demonstrated by the strong significant relationships between satisfaction and usefulness, and between satisfaction and ease of use (p: 100). Hence, this study hypothesizes the following:

*H7: Students satisfaction has a significant effect on perceived ease of use.*

*H8: Students satisfaction has a significant effect on perceived usefulness.*



### ***Perceived Usefulness***

Perceived usefulness is defined as the extent to which a person believes that using a particular system will enhance his or her job performance Davis (1989). Subramanian (1994) found that perceived usefulness had significant correlation with attitude toward usage behavior. This finding was later confirmed by Fu et al. (2006) and Norazah, et al. (2008) who found that behavioral intention was largely driven by perceived usefulness. There has been extensive body of literature in the IS community that provides evidence of the significant effect of perceived usefulness on usage intention (e.g. Taylor & Todd, 1995; Venkatesh& Davis, 2000). Selim (2003) investigated course website acceptance model (CWAM) and tested the relationships among perceived usefulness, perceived ease of use and intention to use with university students. The authors argued that the model fit the collected data and that the usefulness and ease of use turned out to be good determinants of the acceptance and use of a course website. Also, Liu et al. (2005) concluded that e-learning presentation type and users' intention to use e-learning were related to one another, and concentration and perceived usefulness were considered intermediate variables. Park (2009) found that perceived usefulness and perceived ease of use were found significant in affecting user attitude. Other studies have also provided evidence to show that perceived usefulness has influences on attitudes and intention to use technology (Teo 2008, 2011a; Yuen 2002). As a result, this study hypothesizes the following:

*H9: Perceived usefulness has a significant effect on attitude towards using Moodle.*

### ***Perceived Ease of Use***

Perceived ease of use is another major determinant of attitude toward use in the TAM model. Davis (1989, p.320) defined Perceived Ease of Use (PEU) as “*the degree to which a person believes that engaging in online transactions would be free of effort*”. PEU is the fundamental determinant for the acceptance and use of IT in general (Moon and Kim, 2001). This finding was later confirmed by other researchers (e.g. Fagan, Wooldridge, & Neill, 2008; Jahangir & Begum, 2008; Hsu, Wang, & Chiu, 2009; Ramayah, Chin, Norazah, & Amlus, 2005) who found PEU to have positively influenced the behavioural intention to use different IS applications. More specifically, perceived ease of use was found to be significant constructs e-learning literature (e.g. Park, 2009; Liu et al., 2005; Selim, 2003; Lee et al., 2005). Additionally, Park (2009), in his study of understanding university students' behavioural intention to use e-learning, found that perceived usefulness and perceived ease of use were related to one another. Other studies have also offered support to the direct influence of perceived ease of use on perceived usefulness (e.g., Teo et al. 2008; Teo 2011a). These results suggest the following hypothesis:

*H10: Perceived ease of use has a significant effect on students' attitude towards using Moodle.*

### ***Attitude***

Karjaluoto et al. (2002) defined attitude as the one's desirability to use the system. Fishbein and Ajzen (1975) classified Attitude into two constructs: attitude toward the object and attitude toward the behavior. The latter refers to a person's evaluation of a specified behavior. In TAM context, attitude is defined as the mediating affective response between usefulness and ease of use beliefs and intentions to use a target system (Suki&Ramayah, 2010). Davis (1989) stated that a prospective one's overall attitude toward using a given system is an antecedent to intentions to use. A student behavioural intention can be caused by his/her feelings about the system. If the students do not like the system or if they feel unpleasant when using it, they will probably want to replace the system with a new one. Many researchers (e.g. Liu et al., 2009; Lee et al., 2005) have demonstrated that attitude is a direct determinant of behavioural intention. Thus, to investigate the effect of students' attitude on their acceptance and usage of e-MyMathLab, this study hypothesizes:

*H11: Attitude has a significant effect on students' behavioural intention to use Moodle*

## 4.0 METHOD

### 4.1 Measures

Table 1 shows the operationalized definitions of different variables as well as the questionnaire items used in the research model and their sources. A seven point Likert scale with anchors of strongly disagree to strongly agree was used to measure each item.

Table 1. Definitions and measurement items of the constructs used in this study

<b>Perceived Credibility</b>	Perceived credibility indicates the perception of protection of user's transaction details and personal data against illegal entrance		Oni & Ayo (2010)
	Items		
	PC1	Using Moodle would not divulge my privacy.	Yang (2007)
	PC2	Information and News on Moodle are more credible	
	PC3	I would find Moodle reliable in conducting my learning transactions.	
PC4	I would find Moodle kept my information confidential.		
<b>Computer Self Efficacy</b>	Individuals' judgment of their capabilities to use computers in diverse situations.		Thatcher & Perrew (2002)
	Items		
	CSE1	I am confident of using Moodle if I have only the online instructions for reference.	Lee et al. (2003)
	CSE2	I am confident of using Moodle even if there is no one around to show me how to do it.	
	CSE3	I am confident of using Moodle even if I have never used such a system before.	
CSE4	I believe I have the ability to install and configure the software to access Moodle		
<b>Subjective Norm</b>	Individuals' perception that most people who are important to him/her think he/she should/should not perform the behaviour in question		Davis (1989)
	Items		
	SN1	What Moodle stands for is important for me as a university student	Park (2009)
	SN2	I like using Moodle on the similarity of my values and society values underlying its use	
SN3	In order to prepare me for future job, it is necessary to use Moodle		
<b>Satisfaction</b>	A person's feelings or attitudes toward a variety of factors affecting that situation		Wixom & Tood (2005)
	Items		
	SAT1	I am very satisfied with the information I receive from Moodle.	
	SAT2	All things considered, I am very satisfied with Moodle	
	SAT3	Overall, the information I get from Moodle is very satisfying	
<b>Perceived Usefulness</b>	The degree to which a person believes that using a particular technology will enhance his performance.		Davis (1989)
	Items		
	PU1	Using Moodle would enable me to accomplish my tasks more quickly	
	PU2	Using Moodle would make it easier for me to carry out my tasks	
	PU3	I would find Moodle useful	
<b>Perceived Ease of Use</b>	PU4	Overall, I would find using Moodle to be advantageous	Davis (1989)
	The degree to which person believes that using a particular system would be free of effort.		
Items			

	PEU1	Using Moodle is easy for me	
	PEU2	It is easy for me to become skillful at the use of Moodle	
	PEU3	Overall, I find the use of Moodle easy	
<b>Attitude</b>	Attitude towards behavior is made up of beliefs about engaging in the behavior and the associated evaluation of the belief.		Fishbein & Ajzen (1975)
	Items		
	ATT1	Using Moodle is a good idea	
	ATT2	I would feel that using Moodle is pleasant	
	ATT3	In my opinion, it would be desirable to use Moodle	Lee et al. (2003)
	ATT4	In my view, using Moodle is a wise idea	
<b>Intention to Use</b>	Intention to use refers to the extent to which individuals would like to use Moodle		Gupta et al. (2008)
	Items		
	IU1	I would use Moodle for my different learning transactions	Cheng et al. (2006),
	IU2	Using Moodle for handling my university related transactions is something I would do	Jahangir & Begum (2008)
	IU3	I would see myself using Moodle for handling my university related transactions	

## 4.2 Study Sample

A total of 515 usable survey responses were collected and examined from students at an American private university in the State of Kuwait. 44 percent of respondents are males while 56 percent are females. 9 percent of the respondent is aged less than 18 years; while the majority 59 percent were aged between 18-25 years, 27 percent were age between 26-30 years; and only 4 percent were above 30 years of age. Additionally, the majority of the respondents 57 percent were in their first year of studies, while only 7 percent were in their fourth year, and 36 percent were in their second and third year collectively.

Table 2. Demographic data of the respondents

Data	Frequency	Percentage
<b>Gender</b>		
Male	228	44
Female	287	56
Total	515	100.0
<b>Age</b>		
Less than 18 years	48	9
18 – 25 years	306	59
26 – 30 years	138	27
More than 30 years	23	4
Total	515	100.0
<b>Year of Study</b>		
First year	299	57
Second year	112	22
Third year	71	14
Fourth year	38	7
Total	515	100.0

## 5.0 DATA ANALYSIS

Partial Least Square (PLS) of structure equation modelling was used to analyze the data of this study. The research model presented in Figure 2 was analyzed using SmartPLS 3.1 (Ringle, Wende, & Will, 2014). PLS is a variance based method used to estimate structural equation models. Other well-known softwares such as LISREL and AMOS are covariance based that use the maximum likelihood approach to estimate structural equation models. The advantage of using PLS-SEM lies in the fact that no assumption on the distribution of data is needed (Chin et al., 2003). Moreover, a sample size that is 10 times the largest number of indicators is required. The sample size in this study is 515 which is

more than what is required, as the largest number of indicators for one construct is four. This large sample size will increase the consistency of the model estimations. The indicators in the proposed model are all reflective because they are considered as effects of the latent variables (Bollen and Lennox, 1991). Validation of PLS models involve a two-step process: 1) assessing the outer (measurement) model and (2) assessing the inner (path) model. The reliability and validity of the outer-model need to be established before the inner-model is examined (Henseler et al., 2009).

### 5.1 The Measurement Model

Tests for internal consistency, items' loadings, convergent validity and discriminant validity were conducted. Internal consistency reliability and indicators reliability were also evaluated. Specifically, Cronbach's Alpha (Cronbach, 1951), Composite Reliability (Werts et al., 1974) and examination of item loadings (Carmines & Zeller, 1979) cross-loadings (e.g. Yoo & Alavi, 2001) and average variances extracted (AVE) (Fornell & Larcker, 1981) were used.

Convergent validity measures the positive correlation between an indicator and the other indicators of a construct. It can be measured by using the average value extracted measure (AVE) that should exceed 0.5. All values in this model varied between 0.829 and 0.930. The results are presented in Table 3.

Table 3. Items loading, Cronbach's alpha, Composite reliability and AVE

Items	Loading	Cronbach's Alpha	Composite Reliability	AVE
PC1	0.878			
PC2	0.920			
PC3	0.928			
PC4	0.928			
<b>Perceived Credibility</b>		<b>0.934</b>	<b>0.953</b>	<b>0.835</b>
CSE1	0.894			
CSE2	0.940			
CSE3	0.914			
CSE4	0.893			
<b>Computer Self Efficacy</b>		<b>0.931</b>	<b>0.951</b>	<b>0.829</b>
SN1	0.925			
SN2	0.929			
SN3	0.909			
<b>Subjective Norm</b>		<b>0.910</b>	<b>0.944</b>	<b>0.848</b>
SAT1	0.909			
SAT2	0.925			
SAT3	0.932			
SAT4	0.915			
<b>Satisfaction</b>		<b>0.940</b>	<b>0.957</b>	<b>0.847</b>
PU1	0.956			
PU2	0.949			
PU3	0.958			
PU4	0.950			
<b>Perceived Usefulness</b>		<b>0.966</b>	<b>0.975</b>	<b>0.909</b>
PEU1	0.963			
PEU2	0.959			
PEU3	0.961			
<b>Perceived Ease of Use</b>		<b>0.958</b>	<b>0.973</b>	<b>0.923</b>
ATT1	0.938			
ATT2	0.953			
ATT3	0.927			
ATT4	0.938			
<b>Attitude</b>		<b>0.955</b>	<b>0.968</b>	<b>0.882</b>
IU1	0.959			
IU2	0.969			
IU3	0.965			

<b>Intention to Use</b>	<b>0.962</b>	<b>0.976</b>	<b>0.930</b>
Discriminant validity measures the extent to which a latent variable is distinct from other variables. One way to assess discriminant validity is by using Fornell-Larcker criterion (Fornell, Larcker, 1981). It requires that the square root of each construct's (AVE) should be higher than all its correlation with the other constructs. Table 4 provides evidence of the discriminant validity of the item scales used in this study. The bolded items in the matrix diagonals, representing the square roots of the AVEs, are greater in all cases than the off-diagonal elements in their corresponding row and column, supporting the discriminant validity of the item scales.			

Table 4: Discriminant validity (inter-correlations) of the item scales

	<b>ATT</b>	<b>IU</b>	<b>PC</b>	<b>PEU</b>	<b>PU</b>	<b>SAT</b>	<b>CSE</b>	<b>SN</b>
<b>ATT</b>	<b>0.939</b>							
<b>IU</b>	0.421	<b>0.964</b>						
<b>PC</b>	0.356	0.387	<b>0.914</b>					
<b>PEU</b>	0.411	0.432	0.451	<b>0.961</b>				
<b>PU</b>	0.368	0.331	0.322	0.304	<b>0.953</b>			
<b>SAT</b>	0.286	0.260	0.258	0.237	0.200	<b>0.920</b>		
<b>CSE</b>	0.467	0.424	0.490	0.409	0.462	0.412	<b>0.910</b>	
<b>SN</b>	0.255	0.249	0.261	0.266	0.245	0.298	0.235	<b>0.921</b>

The convergent validity of the item scales were assessed by extracting the factor loadings (and cross loadings) of all items to their respective construct. These results, shown in Table 5, indicate that all items loaded: (1) on their respective construct from a lower bound of 0.878 to an upper bound of 0.969 and (2) more highly on their respective construct than on any other construct (the non-bolded factor loadings). A common rule of thumb to indicate convergent validity is that all items should load greater than 0.7 on their own construct, and should load more highly on their respective construct than on the other constructs (e.g. Yoo & Alavi, 2001).

Table 5: Factor loadings (bolded) and cross loadings

<b>Items</b>	<b>PC</b>	<b>CSE</b>	<b>SN</b>	<b>SAT</b>	<b>PU</b>	<b>PEU</b>	<b>ATT</b>	<b>IU</b>
PC1	<b>0.878</b>	0.550	0.249	0.224	0.384	0.220	0.336	0.296
PC2	<b>0.920</b>	0.524	0.274	0.210	0.340	0.238	0.341	0.281
PC3	<b>0.928</b>	0.501	0.223	0.235	0.330	0.241	0.359	0.286
PC4	<b>0.928</b>	0.539	0.215	0.220	0.361	0.229	0.381	0.277
CSE1	0.548	<b>0.894</b>	0.368	0.220	0.448	0.551	0.322	0.118
CSE2	0.565	<b>0.940</b>	0.335	0.210	0.427	0.501	0.330	0.146
CSE3	0.522	<b>0.914</b>	0.360	0.254	0.443	0.523	0.315	0.125
CSE4	0.547	<b>0.893</b>	0.332	0.248	0.410	0.539	0.348	0.139
SN1	0.419	0.321	<b>0.925</b>	0.333	0.551	0.441	0.422	0.322
SN2	0.428	0.333	<b>0.929</b>	0.310	0.522	0.485	0.409	0.301
SN3	0.411	0.398	<b>0.909</b>	0.344	0.534	0.466	0.451	0.343
SAT1	0.445	0.229	0.551	<b>0.909</b>	0.234	0.314	0.441	0.239
SAT2	0.449	0.228	0.560	<b>0.925</b>	0.222	0.354	0.412	0.247
SAT3	0.438	0.216	0.524	<b>0.932</b>	0.215	0.301	0.442	0.248
SAT4	0.424	0.225	0.534	<b>0.915</b>	0.225	0.332	0.435	0.257
PU1	0.551	0.448	0.409	0.238	<b>0.956</b>	0.132	0.254	0.574
PU2	0.568	0.459	0.411	0.221	<b>0.949</b>	0.122	0.224	0.564
PU3	0.549	0.451	0.429	0.222	<b>0.958</b>	0.105	0.235	0.550
PU4	0.533	0.444	0.442	0.217	<b>0.950</b>	0.111	0.241	0.514
PEU1	0.248	0.354	0.561	0.439	0.367	<b>0.963</b>	0.341	0.441
PEU2	0.233	0.333	0.551	0.412	0.359	<b>0.959</b>	0.330	0.446
PEU3	0.245	0.324	0.540	0.400	0.344	<b>0.961</b>	0.301	0.452
ATT1	0.415	0.387	0.422	0.168	0.254	0.508	<b>0.938</b>	0.441
ATT2	0.442	0.364	0.415	0.145	0.246	0.574	<b>0.953</b>	0.456
ATT3	0.422	0.335	0.403	0.110	0.244	0.548	<b>0.927</b>	0.462

ATT4	0.431	0.321	0.421	0.198	0.230	0.560	<b>0.938</b>	0.439
IU1	0.231	0.224	0.252	0.265	0.241	0.234	0.248	<b>0.959</b>
IU2	0.224	0.218	0.268	0.249	0.261	0.274	0.220	<b>0.969</b>
IU3	0.261	0.248	0.227	0.264	0.233	0.289	0.247	<b>0.965</b>

The results of the hypothesis testing are shown in figure 2. (Chin 1998) recommended that Bootstrapping of 500 subsamples is to be conducted to test the significant of the t test. Twelve hypotheses were tested in this model and it was found that all of them were significant at the 0.05 significance level. Table 7 shows the path coefficients, t statistics and p-values.

### 5.2 The Structural Model

Based on the suggestions of Chin (1998), the assessment of the structural model entails: Estimates for path coefficients ( $\beta$ ), Determination of coefficient ( $R^2$ ), and Estimates for total effects. The first step in assessing the structural model, using PLS, should be based on the path coefficient's ( $\beta$ ) direction algebraic sign, magnitude and significance (Chin, 1998, 2010; Götz, et al., 2010; Henseler, et al., 2009; Urbach & Ahlemann, 2010).

Path coefficients of the structural model can be interpreted as standardised beta coefficients of ordinary least squares regressions (Henseler, et al., 2009, p: 304). Path coefficients should exceed .100 to account for a certain impact within the structural model (Nils Urbach & Ahlemann, 2010). Furthermore, path coefficients should be significant at least at the .050 level (Henseler, et al., 2009; Urbach & Ahlemann, 2010). Figure 2 shows the structural model results. All beta path coefficients ( $\beta$ ) are positive (i.e. in the expected direction) and statistically significant (at  $p < 0.05$ ).

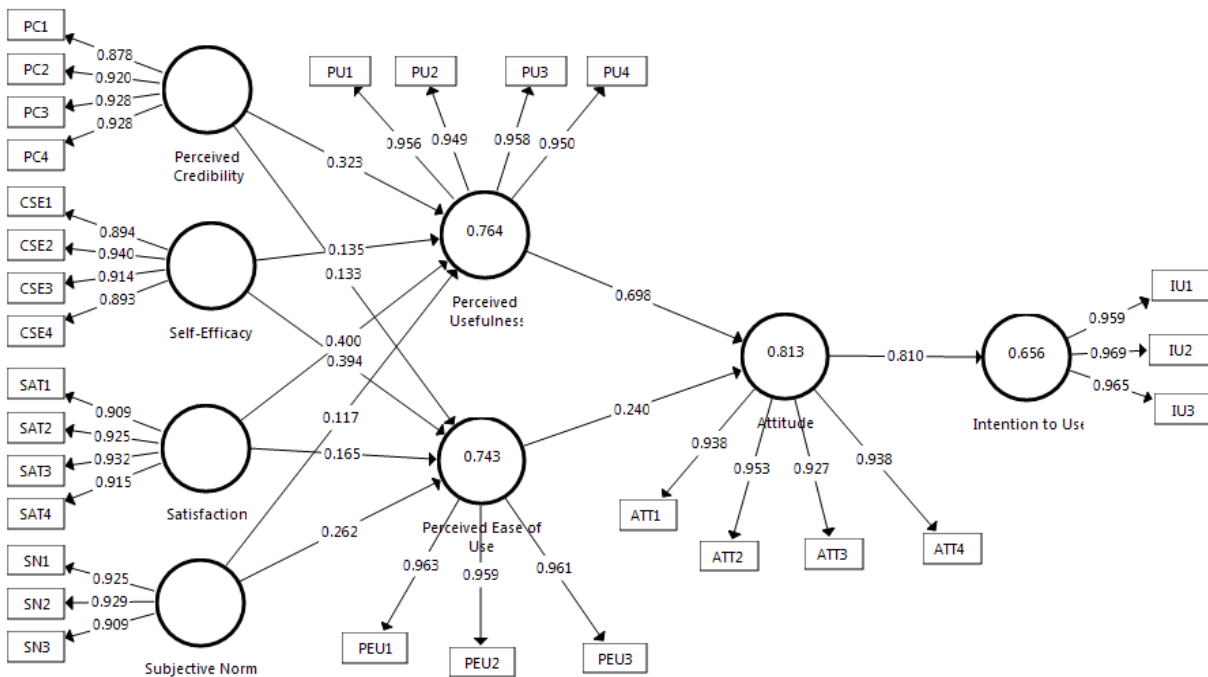


Figure 2. The Structural Model

Since the main purpose of the structural model is to assess the relationships between hypothetical constructs (Götz, et al., 2010), the most essential criterion for the assessment of the structural model is the coefficient of determination ( $R^2$ ) of each of the constructs in the model.  $R^2$  values should be sufficiently high for the model to have a minimum level of explanatory power (Chin, 1998, 2010; Götz, et al., 2010; Henseler, et al., 2009; Urbach & Ahlemann, 2010). In PLS,  $R^2$  values represent "the amount of variance in the construct in question that is explained by the model" (Chin, 2010, p: 674). Chin (1998) considers  $R^2$  values of approximately 0.67, 0.33, and 0.19 as substantial, moderate and weak respectively. The  $R^2$  values of this study are shown in Figure 2. Figure 2 shows the correlation  $R^2$  values for all constructs in the model. The SEM explained substantial variance in

attitude  $R^2 = 0.813$ , in perceived usefulness  $R^2 = 0.764$ , in perceived ease of use  $R^2 = 0.743$  and in intention to use  $R^2 = 0.656$ .

Some researchers (e.g. Albers, 2010; Henseler, et al., 2009) claim that the significance of high direct inner path model relationships (i.e. Estimates for path coefficients ( $\beta$ )) is no longer of interest to researchers and practitioners. Rather, they suggest, the sum of all direct and indirect effects of a particular construct on another construct should be the subject of evaluating the structural model. Table 6 displays the *total effects* on the four predicted constructs.

Table 6: Total effect of the Structural Model

	PU	PEU	ATT	IU
PC	0.323	0.133	0.257	0.208
CSE	0.135	0.394	0.189	0.153
SAT	0.400	0.165	0.319	0.258
SN	0.117	0.262	0.145	0.117
PU			<b>0.698</b>	<b>0.565</b>
PEU			0.240	0.194
ATT				<b>0.810</b>

The results show that students' intention to use Moodle is mainly prompted by attitude and its perceived usefulness. This means that students will use the e-learning system if they have a good attitude towards it and find it useful in their learning process.

## 6.0 HYPOTHESIS TESTING AND DISCUSSION

The empirical tests of the extended TAM model were able to identify factors determining the intention to use Moodle among university students. All study hypotheses were established and confirmed with the results. Table 7 shows a summary of the hypotheses testing results.

Table 7. Hypotheses testing results

	Sample Mean	Standard Error	T Statistics	P Values
H1: Perceived Credibility -> Perceived Ease of Use	0.133	0.056	2.368	0.018
H2: Perceived Credibility -> Perceived Usefulness	0.319	0.052	6.214	0.000
H3: Self-Efficacy -> Perceived Ease of Use	0.390	0.058	6.783	0.000
H4: Self-Efficacy -> Perceived Usefulness	0.135	0.049	2.744	0.006
H5: Subjective Norm -> Perceived Ease of Use	0.262	0.061	4.276	0.000
H6: Subjective Norm -> Perceived Usefulness	0.119	0.048	2.439	0.015
H7: Satisfaction -> Perceived Ease of Use	0.170	0.052	3.161	0.002
H8: Satisfaction -> Perceived Usefulness	0.403	0.046	8.760	0.000
H9: Perceived Usefulness -> Attitude	0.694	0.046	15.258	0.000
H10: Perceived Ease of Use -> Attitude	0.244	0.043	5.538	0.000
H11: Attitude -> Intention to Use	0.810	0.020	40.347	0.000

*H1* is established with the study results, which demonstrate that perceived credibility has a positive association with perceived ease of use (Beta = 0.133, T statistics = 2.368, p-value = 0.018). *H2* was established, which illustrate that perceived credibility has a positive association with perceived usefulness (Beta=0.323, T statistics =6.21, p-value = 0.000). Additionally, *H3* is sustained, which indicates that self-efficacy has a positive influence on perceived ease of use (Beta = 0.394, T statistics = 6.783, p-value = 0.000). *H4* is confirmed, which illustrate that self-efficacy has a positive influence on perceived usefulness (Beta = 0.135, T statistics = 2.744, p-value = 0.006).

*H5* is inveterate; this indicates that Subjective Norm has a positive influence on with perceived ease of use (Beta = 0.262, T statistics = 4.276, p-value = 0.000). *H6* was also confirmed; this demonstrates that Subjective Norm has a positive association with perceived usefulness (Beta = 0.117, T statistics =

2.439,  $p$ -value = 0.015). Further, the study results also confirmed  $H7$  and  $H8$ , which indicate that satisfaction has a positive association with both perceived ease of use and perceived usefulness (Beta = 0.165, T statistics = 3.161,  $p$ -value = 0.002) and (Beta = 0.400, T statistics = 8.760,  $p$ -value = 0.000) respectively.

$H9$  is established with the study results, which demonstrate that perceived usefulness has a positive influence on attitude (Beta = 0.698, T statistics = 15.258,  $p$ -value = 0.000). The study results also established  $H10$  which indicates that perceived ease of use has a positive association with attitude (Beta = 0.240, T statistics = 5.538,  $p$ -value = 0.000). Finally,  $H11$  was confirmed with the study results which show a strong association between attitude and intention to use (Beta = 0.810, T statistics = 40.347,  $p$ -value = 0.000).

## 7.0 CONCLUSION, LIMITATION AND FUTURE RESEARCH

In this study, an extended TAM model was developed to assess technology acceptance and adoption of an e-learning system among university students and used Moodle as an exemplar tool for assessment. The extended model was tested among private American university students in the State of Kuwait.

The survey instrument was evaluated partial least squares of structure equation modelling. Descriptive statistics of the respondents were reported. The reliability of the scale with Chronbach's  $\alpha$  and composite reliability were examined. Discriminant validity and convergent validity were evaluated. Item loading and cross loadings were also tested. These results proved the measurement model validity. The structural model validity was assessed using path coefficients ( $\beta$ ) and Determination of coefficient ( $R^2$ ). Also, estimates for total effects were presented.

The study results showed that the exogenous variables perceived credibility, satisfaction, subjective norm, self-efficacy, perceived ease of use, perceived usefulness and attitude positively affecting the endogenous variable intention to use. The reported results are in line with what is found in literature and can be explained based on the motivational theory (e.g. Lee et al., 2005; Saadé & Kira, 2009; Park, 2009) and previous TAM research (e.g. Selim, 2003; Ngai et al., 2007; Teo, 2009, 2011a). Hence, it can be conclude that the aim of the paper has been attained. Additionally, according to the results, the intension to use Moodle is a result of two factors: perceived usefulness and attitudes towards using it, where the latter is the most significant and strongest predictor of intension to use Moodle.

This research, like any other, has its own set of limitations. First, while the study sample size provides acceptable statistical power, the sample size of this study still considered small. Therefore, future research should investigate cross-validation of the current study with larger samples. Second, the sample of the current study was draw from a homogenous group of students from only one university in Kuwait; this may limit the generalizability of the study results. Future research may be repeated in other universities in the Middle East region and results could be compared with the current study. Third, this study derived the data based on self-reporting measures and did not include any objective measures such as direct observation and non-self-report data; this could be investigated in future work. Fourth, this study is only limited to a particular e-learning system namely Moodle. Although Moodle is a modern and well accepted e-learning system, generalization of this study results is limited to the characteristics and features provided by this particular system. Finally, this study did not examine the influence of gender or age differences on intention to use Moodle, an area that could be investigated in future work also.

Despite the abovementioned limitations, it is believed that this study makes a valuable addition to the technology acceptance in education body of knowledge, and provides useful implications for both theory and practice. In fact, the extended TAM model proposed in this study is believed to be useful in analyzing the adoption and continuous utilization of Moodle among university students in the state of Kuwait. It is also believed that this research is to be the first to find empirical support for these relationships in the Kuwaiti context. Additionally, different from most of the studies that consider western countries, this study supports TAM's reliability and validity in an educational context in the Middle East region and more specifically in Kuwait.



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