MOBILE TECHNOLOGY ACCEPTANCE AMONG ENGLISH LANGUAGE ACADEMICS AT UNIVERSITI TEKNOLOGI MARA

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Abstrak

Pelaksanaan teknologi di dalam pengajaran dan pembelajaran telah mencapai kemajuan melalui penggunaan peranti teknologi mudah alih menggunakan rangkaian komunikasi tanpa wayar. Peningkatan luar biasa pengguna telefon pintar membolehkan universiti mengamalkan pengajaran dan pembelajaran mudah alih yang fleksibel tanpa mengira tempat dan masa. Namun begitu, pendekatan ini memerlukan para pendidik melengkapkan diri mereka dengan kemahiran menggunakan alat teknologi mudah alih. Berdasarkan literatur penerimaan teknologi, tujuan kajian ini adalah mengenal pasti faktor yang mempengaruhi tingkah laku pensyarah bahasa Inggeris dari Akademi Pengajian Bahasa untuk menerima pakai peranti teknologi mudah alih ini. Mengaplikasikan *Technology Acceptance Model* (TAM), penyelidikan ini menggunakan tiga pembolehubah luar iaitu subjektif norma, efikasi kendiri dan pengalaman teknologi mudah alih; tiga faktor utama model TAM iaitu tanggapan kegunaan, tanggapan kemudahan penggunaan dan tingkah laku penggunaan; serta tiga moderator utama iaitu umur, jantina dan budaya university. Sebanyak 337 soal selidik daripada 13 kampus negeri Universiti Teknologi MARA (UiTM) telah dianalisis menggunakan pendekatan *Structural Equation Modelling* (SEM) dengan perisian *Analysis of Moment Structures* (AMOS). Keputusan signifikan diperolehi bagi hubungan utama model TAM kecuali pembolehubah efikasi kendiri yang tidak mempengaruhi tanggapan kegunaan sementara tanggapan kemudahan penggunaan tidak mempunyai hubungan dengan tingkah laku penggunaan peranti teknologi mudah alih. Pembolehubah tanggapan kegunaan pula adalah faktor pengantara untuk subjektif norma dan pengalaman teknologi mudah alih dengan tingkah laku penggunaan. Hanya faktor umur memberi kesan moderator antara tanggapan kegunaan dan tingkah laku penggunaan. Budaya universiti tidak menunjukkan kesan moderator namun kajian telah mengenal pasti unsur yang mempengaruhi budaya kerja pensyarah. Berdasarkan penemuan penyelidikan, UiTM disarankan mengadakan bengkel latihan serta menerangkan dengan jelas dasar universiti mengenai penggunaan peranti teknologi mudah alih dalam aktiviti pengajaran dan pembelajaran. Inisiatif UiTM akan membantu para pendidik menggunakan peranti teknologi mudah alih bagi mencapai aspirasi universiti dan negara untuk menggunakan teknologi dalam mencapai pengajaran dan pembelajaran berkualiti di Malaysia.

Kata Kunci: Peranti teknologi mudah alih, *Technology Acceptance Model*, Pensyarah bahasa Inggeris, Budaya universiti

Abstract

Implementing technology in teaching and learning is advanced by mobile technology devices via wireless communication network. Extraordinary growth of mobile phone users has led to mobile learning that enables universities to implement teaching and learning practices of anywhere and anytime. However, this requires that educators equip themselves with relevant skills in using mobile technology devices. Based on technology acceptance literature, this study aims to identify the determinants that affect behavioural intention of the English language lecturers in Academy of Language Studies to adopt mobile technology devices. Applying Technology Acceptance Model (TAM), the research model formulated three external variables; subjective norm, self-efficacy and prior mobile technology experience; three main determinants of perceived usefulness, perceived ease of use and behavioural usage; and three key moderators of age, gender and university culture. A total of 337 questionnaires from 13 state campuses of Universiti Teknologi MARA (UiTM) were analysed based on Structural Equation Modelling (SEM) approach using Analysis of Moment Structures (AMOS). Significant findings were found for the main relationships except for self-efficacy which did not influence perceived usefulness while perceived ease of use had no relationship with behavioural intention in using mobile technology devices. Perceived usefulness was a mediator for subjective norm and prior mobile technology experience towards behavioural intention. However, only age moderated the relationship between perceived usefulness and behavioural intention. Although university culture did not display moderation effect, the study identified the elements that influence the working culture of the lecturers. Based on the findings, it is proposed that UiTM conducts training workshops and clearly describes the policy of the university regarding mobile devices usage in teaching and learning practices. UiTM's initiative will assist educators in using mobile technology devices towards fulfilling the aspiration of the university and nation to utilize ICT in achieving quality teaching and learning in Malaysia.

Keywords: Mobile technology device, Technology Acceptance Model, English language lecturers, University culture

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List of Abbreviations

AGFI	:	Adjusted goodness of fit index
AMOS	:	Analysis of Moment Structures
ATT	:	Attitude
AVE	:	Average Variance Extracted
BI	:	Behavioural intention
CFA	:	Confirmatory Factor Analysis
CFI	:	Comparative fit index
DIT	:	Diffusion of Innovation Theory
ESL	:	English as a Second Language
GOF	:	Goodness-of-fit
GPS	:	Global Positioning System
ICT	:	Information and communication technologies
ITM	:	Institut Teknologi MARA
MAR	:	Missing at random
MCAR	:	Missing completely at random
ME	:	Mobile technology experience
ML	:	Maximum likelihood
MMS	:	Multimedia Messaging System
NFI	:	Normed fit index
OLS	:	Ordinary Least Square
PDA	:	Personal Digital Assistants
PE	:	Perceived ease of use
PNFI	:	Parsimony normed fit index
PU	:	Perceived usefulness
RMR	:	Root mean square residual
RMSEA	:	Root mean square error of approximation
SE	:	Self-efficacy
SEM	:	Structural Equation Model
SMS	:	Short Message Service
SN	:	Subjective norm

SPSS	:	Statistical Package for the Social Sciences
SRMR	:	Standardized root mean residual
TAM	:	Technology Acceptance Model
TLI	:	Tucker-Lewis index
TPB	:	Theory of Planned Behaviour
TRA	:	Theory of Reasoned Action
UC	:	University culture
UTAUT	:	Unified Theory of Acceptance and Use of Technology
UiTM	:	Universiti Teknologi MARA
WAP	:	Wireless Application Protocol
Wi-Fi	:	Wireless Fidelity

CHAPTER ONE
INTRODUCTION

1.1 Research Background

Technology is the process in which we attempt to expand human potential to improve and control our world and it surrounds our daily lives either in homes or in workplaces (Akour, 2009). Today, learning institutions have integrated technology in its activities and technology has expanded dramatically. However, the implementation of these technologies will only take place if the students and educators of learning institutions accept and use these technologies.

Mobile technology is one of the advancement in technologies and it refers to portable technology that can be moved from one place to another without any loss (Junior & Coutinho, 2008). Portable computers like laptops, Personal Digital Assistants (PDA), iPods, and mobile devices such as smart phones are some of the examples of mobile technology devices. The utilization of these mobile devices is enhanced through the usages of communication technologies which include wireless communication network or Wi-Fi, 3G mobile network, and Bluetooth.

At present, it has become a need to own a mobile device such as a mobile phone because it allows communication and access to data and information in any moment or place. In Malaysia, there is an extraordinary growth of mobile phone users. Due to the rapid decline in the cost of mobile phones and subscription plans, Malaysian cellular telephone subscriptions increased from 42.9 million subscribers in 2013 to

43.8 million subscribers in 2014 over a population of around 30.1 million people (Malaysia Communications and Multimedia Commission, 2014). The penetration rate of 145.8 percent is due to multiple subscriptions of mobile phones users with an increasing popularity on prepaid subscribers. Moreover, Malaysians have been big adopters of SMS, with an estimation of 76.9 million SMS having been sent during 2013. In addition, 431 centers of 1Malaysia Internet Centre have been set up across the country with the aim to bridge the digital divide between rural and urban communities (Malaysia Communications and Multimedia Commission, 2014). On top of that, 84 percent of Malaysia now has cellular coverage which has improved connectivity in those areas (Nagrajan, 2012).

The setting up of Smart Schools in Malaysia is the realization in the implementation of technologies in teaching and learning. However, there are still many schools in Malaysia which are not fully equipped with technology facilities such as the computer (Mariam & Woolard, 2012b). It is time to consider alternative ways to bridge the gap by using much affordable devices such as the mobile phone. With the falling pattern in the prices of mobile phones, it is expected that these devices will become affordable to students (Jackman, 2014). In addition, education providers can gain economic rewards if learning institutions move from using computers to the use of mobile devices since it reduces the need to provide computer labs, staff support and servicing bills (Mahendar Kumar & Arpita, 2013). Besides that, the enhancement of wireless communication network enables the mobile phones to become an effective learning tool with the potential to influence the teaching and learning environment (Kimura, 2009).

It has been noticed recently that the usage of mobile technology devices in teaching and learning seems to be unavoidable (Barreh & Zoraini Wati, 2015; Jackman, 2014). The development of mobile technology has led to the introduction of a new and innovative approach in teaching and learning known as mobile learning. Using mobile devices, mobile learning permits moveable learning surroundings which allow learners to access learning materials beyond their conventional classroom situations. According to Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sánchez and Vavoula (2006), mobile learning offers a change in the style of teaching and learning and it makes learning more personalized, authentic, and informal. Even though mobile learning has produced student engagement and increased autonomy in learning experiences, educators still play significant roles in guiding the students to effectively use and understand the functions of mobile technologies (Kukulska-Hulme, 2013). Through professional courses on teaching development, educators are more likely to embrace mobile technologies in teaching and learning practices and become skilled educators (Keengwe, Schnellert, & Jonas, 2014; Traxler & Vosloo, 2014).

Mobile technology and its devices have also been used to learn languages. Research was carried out to examine language learning applications using mobile devices (e.g. Brown, 2008; Chen & Hsu, 2008; Hashemi & Azizinezhad, 2012; Huang, Yang, Chiang, & Su, 2016; Kimura, 2009; Kimura & Shimoyama, 2009; Mariam & Woollard, 2012a; Thornton & Houser, 2005). By using a mobile device, a language learner is able to retrieve audio or video tutorials, send text or picture messages or just make phone calls to ask for guidance and information. Moreover, the learner gets to access sources that offer a lot of information on vocabulary, grammar, idioms and phrasal verbs particularly in the English language. Examples on the usage of mobile phones to learn the English language through Short Message Service (SMS) include vocabulary (Chen, 2014; Huang *et al*., 2016; Mariam & Woollard, 2012a) and phrasal verbs learning (Pirasteh & Mirzaeian, 2015). In addition, a program called Vidioms Lessons (https://wikis.engrade.com/vephrasals/ vidioms) offers multimedia capabilities by providing explanations besides displaying short videos on the English idioms (Thornton & Houser, 2005).

In developing countries of Asia, the usage of mobile phones in education has been examined (Valk, Rashid, & Elder, 2010). Even though the application of mobile technology is still relatively new in the education world, especially in Malaysia, its usage in teaching and learning practices has started to gain interest especially among the higher learning institutions (e.g. Harwati, Melor, & Mohamed Amin, 2012; Mohd Hafiz, Lazim, & Yazid, 2012; Mohd Nazri, Ahmad Wiraputra, Eimiza Faisha, Mohamad Yunus, & Prabu, 2012; Tan, Lee, & Ng, 2012). The institutions are expected to prepare the next generation of citizens for the technologically oriented global world. To achieve this, institutions of higher learning need to incorporate educational technology applications in achieving the objectives of producing technologically-enabled students. On top of that, educators in higher learning institutions should start considering the possibility of integrating mobile learning in their teaching practices as there is an increase in the number of mobile phone users among students (Supyan, Mohd Radzi, Zaini, & Krish, 2012).

The establishment of wireless infrastructure has enabled the higher learning institutions to move towards user mobility in campus. In addition, it proves to be more cost effective than using the traditional wired network (Kim & Chung, 2006). With this wireless system, users in higher learning institutions are able to log on to the Internet, surf on the websites and manage their emails using portable computers or laptops that are connected to wireless networking such as the Wi-Fi. Indirectly, educators in schools and higher learning institutions need to welcome the introduction of this new technology. They need to prepare and equip themselves with relevant and adequate knowledge or skills to enable them in using the technology. Thus, it is important to conduct research related to the usage of mobile technology especially in the higher learning institutions environment.

1.2 Background on Universiti Teknologi MARA

Universiti Teknologi MARA (UiTM) is the largest university in Malaysia which has encountered a phenomenal growth since its establishment. The institution started with the opening of RIDA Training Centre in 1956 which later became known as MARA College in June 1965. MARA College was officially renamed Institut Teknologi MARA (ITM) on 14 October 1967 with the objective to fulfill the crucial need of professional and semi-professional levels of Bumiputeras trained manpower. Then, in August 1999, YAB Dato' Seri Dr Mahathir Mohamad, the former Prime Minister, announced the change in the name of ITM to UiTM with the aspiration of being a world class university in all its endeavours besides remaining its focus on academic excellence, innovation, socio-economic goals, worldwide accreditation, globalisation and new technologies in order to contribute to industry and national development (Universiti Teknologi MARA, 2012).

At the moment, the university has a total of thirty-five campuses throughout Malaysia which comprises of Shah Alam main campus, satellite campuses, state campuses and city campuses; with a workforce of 17,000 people including 4,000 academics staff. Currently, UiTM has 24 faculties, two academic centres and more than 300 academic programmes with its enrolment of nearly 172,000 registered students (Wikipedia, 2015b). In 2006, the government gave the mandate for UiTM to increase its students' enrolment to 200,000 (Azlan, Posiah, Nor Adura, Siti Rahayu, & Mohd Nor Hajar, 2009) and the former Vice-Chancellor of UiTM, Dato' Professor Ir. Dr. Sahol Hamid Abu Bakar, has set the vision to fulfill the target number by the year 2020 (Ahmad Redzuan & Soraya, 2010).

Being a comprehensive university, UiTM offers a wide range of courses besides having quality lecturers to realize the objectives of UiTM as a centre of academic excellence (Kementerian Pengajian Tinggi, 2011). With the intention to cater the huge number of students, the university needs to build new infrastructures especially buildings to accommodate lecture rooms and computer laboratories with internet facilities for courses in multiple disciplines. These facilities are needed to fulfill the students' essentials of a learning environment. In addition, UiTM needs to increase its number of academic staff or lecturers to comply with the increasing number of students and to attain the effectiveness of its teaching and learning activities. This in turn leads to the requirement of workplaces and office equipment for the new lecturers to accomplish their teaching tasks. The requirements to employ academic staff and to develop new infrastructure for the students and lecturers require a lot of funds and resources. In the Ninth Malaysia Plan (2006-2010), the Malaysian Government has granted UiTM an allocation of RM2.9 billion to execute the task of acquiring 200,000 student enrolments (Dewan Rakyat, 2006). However, in the year 2017, the operating expenditure for UiTM was only RM1.67 billion (Malaymail Online, 2016).

1.2.1 E-learning in UiTM

One of the objectives of UiTM is to educate the Bumiputera citizens to become professionals of high caliber who will be independent, knowledgeable and morally upright in the conduct of competing in business trade, science and technology (Rugayah, Hashim, & Che Zainab, 2010). As such, the integration of information and communication technologies (ICT) in teaching and learning system of UiTM is unavoidable especially in creating new and open learning environments. In 1998, UiTM took full advantage of the advance in ICT by introducing a flexible learning programme via internet which incorporates a variety of teaching and learning methods such as distance learning, seminars, video conferences, lectures and e-mails (Raja Abdullah, Adnan, & Kamaruzaman, 2011).

UiTM initiated the e-learning drive with the establishment of i-Learn Centre in December 2005 operating under the Academic Affair Division with the responsibility of handling the adaptation of e-learning in UiTM (i-Learn Portal, 2012). i-Learn portal is the system that allows lecturers to link the courses taught for students to access related resources for the course. As mentioned by Posiah, Siti Akmar and Kamaruzaman (2008), “the adoption of e-learning is a further step towards manifesting the vision of technology serving lifelong learning and a knowledge based society through enculturation of new and effective pedagogies” (p.113). Furthermore, e-learning has the potential to enrich and complement the effectiveness of traditional teaching and learning by empowering students to become active and self-paced learners besides allowing lecturers to continuously update instructional materials. With the target of reaching 200,000 students, the university’s top management acted on the conviction that technology and e-learning will improve learners’ support and reduce the demands on buildings and facilities (Posiah, Siti Akmar, & Kamaruzaman, 2008). In addition, e-learning technology approach could be a solution in catering the huge number of students and providing assurance towards continuous learning opportunities (Azlan *et al*., 2009).

Besides offering a flexible learning programme and distance learning courses to its students, UiTM has also implemented blended learning into some of its full-time courses since early 2010 (Rafizah, Azlina, Wan Anisha, & Zuraira, 2017). Blended learning is the integration of e-learning and the traditional face-to-face instruction which means the lecturers still give lectures in classroom environment but the tutorial sessions are conducted through online using the i-Learn system (Naemah, Jamal, & Saiful Nizam, 2016). Flexibility in terms of time and place are given to these lecturers and students during the online tutorial sessions which means they can log in into the system anytime and anywhere as long as the hours for the tutorial sessions are completed. This approach is expected to overcome the problem of classroom insufficiency especially in addressing the increasing number of students' admission (Norlina, Norulhidayah, Nik Marsyahariani, & Azlan, 2010). Besides that, the combination of face-to-face classroom interaction and online instruction reduces classroom contact hours, promotes flexibility of space and time, increases opportunities of sharing ideas as well as supports students' self-learning and responsibility (Norsaniah, Posiah, Siti Akmar, Norzaidah, & Mohd Ali, 2012).

1.2.2 Language Course in UiTM

One of the courses offered in UiTM which is made compulsory for all diploma and degree students is the language course either at the proficiency level or for specific purpose which includes English as a Second Language (ESL), as well as that of other Asian and European languages. These undergraduate students would have to be proficient not only in the English language, but also in a third language and this language competency gives UiTM students a competitive edge in the job market. For this purpose, UiTM has established the Academy of Language Studies to formulate its language curriculum and manage the learning and teaching of these languages. Following to that, Academy of Language Studies has established three departments which are the Department of English Language and Linguistics, Department of Malay Studies and Department of Asian and European Languages to cater the needs of the students in learning languages. At the moment, UiTM has more than 500 language lecturers serving in various faculties in Shah Alam and branch campuses all over Malaysia (Academy of Language Studies, 2015).

Due to the advancement of ICT in education and the widespread of ubiquitous computing and mobile facilities, Academy of Language Studies has reviewed its teaching methodology and included online assessments through i-Learn portal as a part of students' learning approach (Nurmaisara, Mohd Nor, Mohd Ali, Azlan, Prasanna, & Nurul Hidayah, 2012; Zarlina, Airil Haimi, Sheema Liza, & Johana, 2012). It is a crucial step for the university to adopt and implement these technologies in enhancing learning and pedagogy especially to fulfill the needs and demands of the new generation of technology-enabled students. In addition, the role of technology as a resource for instruction of language learners is increasing as lecturers recognize the ability to create independent learning environments for students to acquire and practice languages. According to Jitlekha (2005), online assessments can be executed through several ways which include email submissions of essays or report, participation in discussions or collaborative projects, computer-marked assignments, and oral test through video-conferencing.

The teaching and learning of foreign language courses such as Mandarin, French and Arabic in UiTM has supplemented the use of online learning materials such as web-based instruction as a part of its e-learning approach. Research has been conducted to investigate its effectiveness and it can be concluded that web-based instruction is a feasible instructional medium in supplementing the online teaching and learning of foreign languages (Goh & Irfan Naufal, 2010). Even though the implementation of e-learning provides opportunities for students to create independent learning, researchers found that language instructors still have an important role in implementing technology enhanced learning environments (Goh, Ng, Raja Mariam, & Wan Anuar, 2004; Nor Aziah & Haziah, 2005; Persico, Manca, & Pozzi, 2014). This means that teaching expertise is still considered as a primary criterion for the success of online language teaching and learning environment.

The introduction of i-Learn system in UiTM has also influenced the teaching and learning approach of the English language. This can be seen through the implementation of online assignments or quizzes into the English language courses in which the students need to go into the e-learning system and conduct assignments or quizzes published in the respective i-Learn courses while the lecturer observes and records the students' performances for those online assignments. The students can either choose to perform the online tasks during class hours when instructed by the lecturer or outside the classroom environment as a base for them to fulfill their student learning time. However, when the students are required to perform online tasks during classroom hours, this type of teaching and learning processes need to be conducted in classes equipped with computers with internet connections. Since the number of students in UiTM has been increasing due to the target in fulfilling 200,000 enrolments (Posiah, Siti Akmar, & Kamaruzaman, 2008), UiTM needs to develop more language laboratories equipped with computer and Internet facilities. Building new infrastructures requires an extensive amount of budget and time consuming, so the lecturers and students of UiTM need to overcome the issue of inadequate computer laboratories. The application of mobile technology is an alternative approach in teaching and learning as its usage will help move the current trend of using computer laboratories in language learning towards wireless and mobile application. It also provides assurance on continuing learning opportunities at anywhere and anytime (Azlan *et al*., 2009).

1.3 Research Problem

Implementing current education technology facilities such as computer laboratories and Internet facilities in universities require great budget and may take several years to complete the development. Oboegbulem and Godwin (2013) asserted that universities provide an extensive amount of investments towards ICT development in fulfilling the needs of students and academics. In the case of UiTM, the government has allocated a huge amount of budget for UiTM in developing its facilities and infrastructure besides engaging the number of employees needed to operate its function as a higher learning institution. Nevertheless, the financial resources for the year 2010 faced a 12.2 percent reduction as compared to the year 2009 (Pejabat Bendahari, 2010). Subsequently, with the increasing number of students and employees but facing constraints in the limited amount of funds, UiTM faces a major challenge to cater the physical facilities needed by university community (Berita Pejabat Bendahari, 2012).

In relation to the utilization of e-learning in higher learning institutions, some of the reasons given by lecturers for not fully integrating the technology in their teaching practices are lack of time, lack of facilities, and academic staff burdened with heavy teaching load (Afendi, Mohamed Amin, & Abdul Halim, 2011; Mohamed Amin, 2011). In addition, even though the majority of UiTM lecturers have good computer knowledge, they identified heavy teaching workloads and lack of technological infrastructure as the main barriers to implementing e-learning (Singh & Sandhu, 2006; Syed Jamal, Mohd Rashidee, & Jamaliah, 2007). As such, Anuwar (2004) suggested that the usage of mobile devices through the concept of mobile teaching and learning can facilitate e-learning and overcome the problem of inadequate infrastructure and accessibility restriction.

The introduction of mobile teaching and learning has led to the utilization of mobile technology devices such as portable computers, mobile phones, smart phones, PDAs, and iPods (Akour, 2009). These devices have been used as an academic support in language learning through online assignments, access to Internet and communications between learner-learner as well as learner-teacher (Barker, Krull, & Mallinson, 2005). Mobile devices have been exploited in research through the provision of language learning experiences in vocabulary enhancement (Brown, 2008; Chen, 2014; Huang *et al*., 2016; Kimura & Shimoyama, 2009), reading comprehension (Chen & Hsu, 2008; Lin, 2014) and listening skills (Kimura, 2009). The use of mobile technology offers opportunities for language learning either in formal classroom situation or informal setting outside of classroom borders (Bahrani, 2011). Language learners have been found using mobile devices to support their learning which leads to the important role of educators' pedagogical expertise in addressing the specific attributes of mobile learning (AbuSa'aleek, 2014). Even though mobile learning focuses more on the learners, it is noted that learners will struggle without an educator's direction and guidance (Kukulska-Hulme, 2009). This leads to the issue of teaching using mobile devices which requires the investigation of language lecturers' readiness and acceptance in using mobile technologies in their teaching methodology.

Studies have also acknowledged the benefits of employing mobile devices in teaching and learning activities (Devadoss, 2011; Kim, Mims, & Holmes, 2006) but issues on its usage among educators have also been highlighted. The matters include educators are not keen in embracing technology and not committed to practice student-centered mobile learning (Karsen, Siswono, & Widianty, 2015; Vogel, Kennedy, & Kwok, 2009), low levels of mobile technology usage (Kukulska-Hulme *et al*., 2006) as well as uncomfortable feelings and lack of confidence in pedagogical potentials of mobile devices (Tai & Ting, 2011; Yuen & Ma, 2004). In the era of information age, students' learning styles are changing as mobile technology offers students to access information at any location and anytime. As suggested by Brown

(2005), educators should embrace the rich enhancing possibilities that technology provides. However, educators are not only facing technical mastery issue but they also have to keep track on the changes and innovations in education technology (McNaught & Vogel, 2004; Chwo, Marek, & Wu, 2016). Due to that, educators need to have skills, knowledge and be ready in terms of innovative pedagogical techniques of using mobile technology in their teaching styles and utilizing it in their work culture (Supyan *et al*., 2012; Traxler & Vosloo, 2014).

The choice of integrating ICT in teaching and learning activities such as e-learning or mobile teaching and learning in universities are formulated without considering or recognizing the factors that influence the students' or the academics' acceptance and practice of technology. The failure to recognize the influencing factors of technology acceptance can lead towards the users' unwillingness to accept and utilize the new technology and consequently resulting to the failure of integrating technology in teaching and learning in higher learning institutions (Davis, 1993; Davis & Venkatesh, 1996; Wong, Rosma, Goh, & Mohd Khairezan, 2013). In relation to that, several research has been done by incorporating the Technology Acceptance Model (TAM) to investigate learners' perceptions towards using mobile technologies in language learning (Hayati, Koo, & Song, 2009; Venkatesh, Nargundkar, Sayed, & Shahaida, 2006). However, not many were found to explore educators' perceptions towards such technology (Shohel & Power, 2010). Studies have shown that the knowledge and attitude toward the technology can influence the educators to adopt such technology (Karsen, Siswono, & Widianty, 2015; Kessler &

Plakans, 2008) which leads to the notion that mobile technology research should not just focus on educator's knowledge about technology, but also include their perceptions and usage of mobile technology as a tool for teaching and learning (Tai & Ting, 2011). In addition, it has also been noticed that there were inconsistencies of determinants and moderators used in the TAM models to predict user behaviour of mobile technologies. It is possible that other determinants and moderators also play important roles in influencing users to adopt mobile technology specifically focusing on the educators of specific organizations. Through the investigation of the individual's perceptions towards the technology, it will then provide a set of determinants of technology acceptance which can be used to further enhance the social shaping and the individual's active participation in the technology (Park, 2005).

The issues presented above, which include the need for the university to improve on the delivery of education services, the shortage of funds to expand facilities and engage workforce, the differences in technology perceptions between the language academics and students, and the lack of lecturers' understanding and readiness towards integrating such technology, lead to the importance of investigating the factors affecting mobile technology acceptance among university English language lecturers.

1.4 Purpose of the Study

The purpose of the study is to investigate the factors that affect the intention to adopt mobile technology devices among UiTM English language lecturers and their level of experience in integrating mobile technology device in their teaching processes. The evaluation of this model could help university administrators and education practitioners predict acceptability of a technology, understand the reasons that promote technology acceptance and take efficient measures to support and encourage user acceptance of the technology (Davis, 1989; Park, 2011).

1.5 Research Objectives

From the literature review, this study adapts TAM and TAM2 (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000) by including behavioural intention (BI) as the dependent variable while perceived usefulness (PU) and perceived ease of use (PE) are the independent variables. In addition, this study selects subjective norms (SN), self-efficacy (SE) and prior mobile technology experience (ME) as the external variables for PU and PE. As such, the independent variables of PU and PE become mediating variables toward the dependent variable of BI. Based on TAM studies review (Han, 2003; Lee, Kozar, & Larsen, 2003; Marangunić & Granic, 2015; Sun & Zhang, 2006), this study also includes the moderator variables of gender, age and university culture into the proposed research model in order to analyse the UiTM English language lecturers' intention to adopt mobile technology devices.

Based on the identified variables, the following specific objectives for this study are derived:

1. To determine whether subjective norm, self-efficacy and prior mobile technology experience have an influence on perceived usefulness and perceived ease of use of mobile technology
2. To evaluate whether perceived ease of use has a significant influence on perceived usefulness of mobile technology
3. To assess whether perceived usefulness and perceived ease of use have an influence on behavioural intention of using mobile technology
4. To ascertain whether perceived usefulness and perceived ease of use mediate the relationship between subjective norm, self-efficacy and prior mobile technology experience towards behavioural intention of using mobile technology
5. To identify whether age, gender and university culture act as moderators to the relationship between perceived usefulness and perceived ease of use towards behavioural intention of using mobile technology.

1.6 Research Questions

Referring to the objectives, the research questions of this study are:

1. Do subjective norm, self-efficacy and prior mobile technology experience have an influence on perceived usefulness and perceived ease of use of mobile technology?

2. Does perceived ease of use have a significant influence on perceived usefulness of mobile technology?
3. Do perceived usefulness and perceived ease of use have an influence on behavioural intention of using mobile technology?
4. Do perceived usefulness and perceived ease of use mediate the relationship between subjective norm, self-efficacy and prior mobile technology experience towards behavioural intention of using mobile technology?
5. Do age, gender and university culture act as moderators to the relationship between perceived usefulness and perceived ease of use towards behavioural intention of using mobile technology?

1.7 Research Hypotheses

This study applies alternative hypothesis as it intends to prove the statistical significance between measured variables through direct and explicit testing which represents the observed effect of the identified variables (Surbhi, 2016). In relation to the research questions above, the following hypotheses are generated:

Hypothesis 1:

H1a: Subjective norm (SN) has a significant influence on perceived usefulness (PU) of mobile technology.

H1b: Self-efficacy (SE) has a significant influence on perceived usefulness (PU) of mobile technology.

H1c: Prior mobile technology experience (ME) has a significant influence on perceived usefulness (PU) of mobile technology.

Hypothesis 2:

H2a: Subjective norm (SN) has a significant influence on perceived ease of use (PE) of mobile technology.

H2b: Self-efficacy (SE) has a significant influence on perceived ease of use (PE) of mobile technology.

H2c: Prior mobile technology experience (ME) has a significant influence on perceived ease of use (PE) of mobile technology.

Hypothesis 3:

H3: Perceived ease of use (PE) has a significant influence on perceived usefulness (PU) of mobile technology.

Hypothesis 4:

H4a: Perceived usefulness (PU) has a significant influence on behavioural intention (BI) of using mobile technology.

H4b: Perceived ease of use (PE) has a significant influence on behavioural intention (BI) of using mobile technology.

Hypothesis 5:

H5a: Perceived usefulness (PU) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology.

H5b: Perceived usefulness (PU) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology.

H5c: Perceived usefulness (PU) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology.

Hypothesis 6:

H6a: Perceived ease of use (PE) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology.

H6b: Perceived ease of use (PE) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology.

H6c: Perceived ease of use (PE) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology.

Hypothesis 7:

H7a: Age moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

H7b: Gender moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

H7c: University culture moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

Hypothesis 8:

H8a: Age moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

H8b: Gender moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

H8c: University culture moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

These research hypotheses are based on the conceptual framework of the study which is subsequently presented after literature review in Chapter 2.

1.8 Significance of the Study

The application of mobile technology is growing rapidly all over the world but its implementation in Malaysia is still new. This area of research on mobile technology is important to the digital generation because the utilization of mobile technology has the potential to develop as one of the teaching and learning tools (Goh & Kinshuk, 2006; Motlik, 2008). With the knowledge of the research in mobile technology, it will help educators and universities to implement mobile teaching and learning practices effectively and successfully.

The main significance of this study is the contribution towards global understanding of technology acceptance research streams and literatures as the findings may provide an increased understanding of user behavioural intention towards the adoption of mobile technology. This aim is achieved through the identification of determinants that affect the users' intention to adopt certain technology which is determined by understanding the models and theories of technology acceptance. It is expected that the study contributes to a wider understanding of usage behaviour and provides a clearer view and details on the key determinants that influence the English language educators in UiTM to use mobile technology in their teaching practices along with the moderators or cultural aspects that fulfill the gap on the literature of mobile technology usage in education especially in the Malaysian context. It is hoped that the results of this research will contribute to the body of knowledge in the area of mobile technology acceptance by providing useful information to academicians and higher learning institutions that are moving towards the development and implementation of mobile learning.

The findings of this research will benefit several parties including the educators. By investigating the factors that influence the English language lecturers to use mobile technology, it will help to increase their awareness of the need to implement and integrate technology across all disciplines in the teaching and learning processes. Besides that, teaching through technology will change and improve the professional practice and performance of these academics as they can work more effectively, efficiently and productively (Karsen, Siswono, & Widianty, 2015; Napaporn, 2007). Looking into the context of language teaching using mobile technology, it is important to identify precise and accurate skills to be mastered by these educators. Even if they have a high level of interest towards the usage of mobile technology, they will not be able to utilize it effectively if they are not adequately knowledgeable and trained to use such devices. Thus, this research will help these educators to pay particular attention to their level of readiness and skills in using mobile technology in their teaching practices.

Moreover, the knowledge from this research can assist and support higher learning institutions on how to promote and improve mobile technology environment towards better future teaching and learning applications. It offers the university administrators the features that influence lecturers' acceptance towards mobile technology and subsequently provides them the ability to build strategies, establish policies and make decisions within the university context. The launching of Malaysia Education Blueprint 2015–2025 (Higher Education) highlights the implementation of ICT-based learning through globalised online learning courses as one of the shifts that universities need to achieve to increase quality and broaden access to education (Ministry of Education Malaysia, 2015). Enhancing online learning infrastructures requires huge expenditure which is a challenge faced by university since government funding has been reduced (Malaymail Online, 2016). As such, the usage of mobile technology devices could reduce the financial constraints of providing infrastructure and assist universities in implementing online courses through the lower cost of delivery methods.

Consequently, this can increase the success of implementing mobile technology into the teaching and learning processes by providing the university management the choices to make effective decisions regarding technology investments. These include providing more system facilities as in wireless applications throughout the university campus and technical assistance. The findings could also help the university administrators to set up instruction programs for its academic staff which emphasize on the usefulness of mobile technology and its implication towards the university. The training programs could also focus on the guidance to use mobile devices and the skills or knowledge in the application of mobile technology.

Thus, the analysis of this research will help to further understand academics' perceptions and identify the factors that influence the acceptance of mobile technology among the English language educators in UiTM. This will then assist the university to gain success in this new ICT implementation and ensure the achievement of its pedagogical aspects.

1.9 Limitations of the Study

The study examines the factors that influence UiTM English language lecturers toward the usage of mobile technology. For this study, the sample only involves the English language lecturers from the Academy of Language Studies in UiTM state campuses. Therefore, its findings on the factors that influence the usage of mobile technology cannot be generalized to all other lecturers from other faculties in UiTM or those in other higher learning institutions in Malaysia.

In addition, the research framework designed to examine user acceptance towards mobile technology is based on the notion that this technology has not been fully integrated in the teaching and learning practices of UiTM. In other words, the result of this research does not measure the actual usage of mobile technology among UiTM English language lecturers, but merely to investigate their behavioural intention to adopt mobile technology in their teaching practices in the future. On top of that, this research is a cross-sectional type of study which means the findings for this research are based at one particular point in time. These English language lecturers' experiences and the factors that influence them to adopt mobile technology may change over time.

1.10 Operational Definition of Key Terms

The rapid growth of mobile technology has developed several terms related to its advancement. The followings are the operational definitions adapted from associated expressions to suit the purpose of this study.

Behavioural intention (BI) is the measure of strength of the English language lecturers to accept mobile technology devices as tools for teaching and learning purposes (Ajzen, 1991).

Mobile learning (m-learning) is defined as the spontaneous and mobility process of education which includes teaching and learning of the English language using mobile technology devices like mobile phone and smart phone (Brown, 2008; Shih, 2007).

Mobile technology is defined as a computing apparatus that uses cellular communication such as portable computer or laptop, mobile phone, smart phone, PDA, and MP3 device such as the iPod (Akour, 2009).

Mobile technology acceptance refers to the willingness or intention of the English language lecturers to employ mobile technology devices to support their teaching and learning practices (Teo & Zhou, 2014).

Perceived ease of use (PE) is the degree to which the English language lecturers believe that using mobile technology devices in teaching and learning activities would be free of effort (Davis, 1989).

Perceived usefulness (PU) is defined as the degree to which the English language lecturers believe that using mobile technology devices would enhance their teaching and learning activities (Davis, 1989).

Prior mobile technology experience (ME) means the understanding and knowledge gained by the English language lecturers from using mobile technology devices like mobile phone and smart phone (Theng, 2009).

Self-efficacy (SE) is defined as the belief that the English language lecturers have the capabilities to use mobile technology devices in their teaching and learning activities (Venkatesh, 2000).

Subjective norm (SN) refers to the English language lecturers' perceptions that most people who are important to them think they should or should not use mobile technology devices in their teaching and learning activities (Fishbein & Ajzen, 1975).

1.11 Chapter Summary

Through the presentation of background information on mobile technology, its implementation in teaching and learning practices, the language courses in Universiti Teknologi MARA (UiTM) and the current problem faced by the institution, this chapter presented the rationale and implication for executing the study. In addition, the chapter also described the five objectives, five research questions and eight main hypothesis of the study. The next chapter discusses the related literatures that support the concept being proposed by the researcher and the identification of variables which leads to the development of the conceptual model.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Today, phones are carried everywhere as we are in the mobile age. Due to the advances of technology, education is moving towards the integration of mobile technology into the procedures of teaching and learning. As such, research investigations on mobile technology are moving away from its infancy stage and have started to gain the interest of educators and practitioners. The application of technology into education has led to the introduction of a new-technology based on educational paradigm which is mobile learning (Traxler & Vosloo, 2014). Consequently, this section reviews the literature on Malaysia Education Blueprint, pedagogical approaches in teaching and learning practices, recent research of mobile learning, the concept of teaching using mobile technology and studies related to Technology Acceptance Model (TAM) that investigate the factors associated with the adoption of mobile learning and technology. It also presents the proposed research framework in investigating the key determinants of Universiti Teknologi MARA (UiTM) English language lecturers' intention to use mobile technology in their teaching practices.

2.2 Malaysia Education Blueprint

Malaysia has experienced enormous and continuous transformations in its higher education system as to offer quality education and fulfill the interest of becoming an education hub (Selvaraj, Anbalagan, & Azlin Norhaini, 2014). This has led to the formulation of Malaysia Education Blueprint 2013-2025 which presented the 10 Shifts (refer Figure 2.1) that are hoped to encourage continued excellence in higher education system (Ministry of Education Malaysia, 2015). Shift 1 to Shift 4 concentrates on higher education system outcomes which comprise of holistic, entrepreneurial and balanced graduates, excellent talents of academic community, Malaysians involved in lifelong learning and quality students of technical and vocational education and training (TVET) (Ministry of Education Malaysia, 2015). The other six shifts emphasize on enablers which involve the elements of expenditure, governance, innovation, internationalization, online learning, and changes of delivery methods (Ministry of Education Malaysia, 2015).

(Source: Ministry of Education Malaysia, 2015)
Figure 2.1. The 10 Shifts in Malaysia Education Blueprint 2013–2025

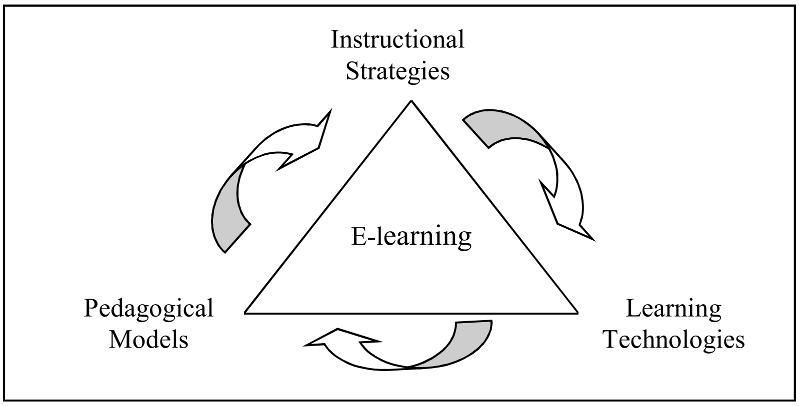
It should be noted that Shift 2 (talent excellence) and Shift 9 (globalized online learning) correlates to the issue of integrating mobile technology device in teaching and learning practices. The provision of Shift 2 focuses on developing high-quality and proficient educators in higher learning institutions which could be related to quality of teaching, changing responsibilities and current expectations of the education system such as using technology in teaching methods. Higher learning institutions should then offer practices and guidelines to support the academics' talent development strategies. In addition, Shift 9 relates to the utilization of online learning as to extend the access of learning content and improve the quality of teaching and learning through the introduction of Massive Open Online Courses (MOOCs). Since most people nowadays own mobile devices such as smart phone and the Internet penetration in Malaysia is about 67% (Ministry of Education Malaysia, 2015), online learning could be successfully implemented through the usage of mobile technology devices. As such, this study concentrates on the educator's intention to use mobile technology device in teaching and learning activities.

2.3 Pedagogical Approaches in Language Teaching and Learning

Pedagogy or teaching method is essential to ensure that effective teaching and learning takes place within or outside the classroom either through traditional or conventional teaching method as in personalized teacher-centered style (face-to-face) or innovative teaching method using ICT as in e-learning and mobile learning. In traditional language teaching and learning, the teacher presents the linguistic items to the students who then practice and produce the item using language course books and materials. These activities are done face-to-face through lecture modes in which the teacher presents and explains the language contents using whiteboard, marker pen and teaching materials while the students are allowed to ask questions (Rafizah *et al*., 2017). However, the advancement of technology has played a very important role in language teaching and learning as it creates opportunities for students to gain confidence in producing language items and makes teaching and learning activities become more interesting and enjoyable. As such, the inclusion of ICT technologies has persuaded the language instructors to examine the pedagogical approaches related to the innovative program applications and devices as to ensure it promotes the activities of teaching and learning (AbuSa'aleek, 2014).

2.3.1 E-learning Pedagogical Models

A model for integrating e-learning in teaching practices would demonstrate the pedagogic principles of using technology in order to choose relevant teaching activities and achieve better learning outcomes. Many pedagogical frameworks for e-learning have been presented by researchers who investigate e-learning practices in various teaching activities based on different learning theories. One of the frameworks presented was Theory-Based Framework for e-learning by Dabbagh (2005) who integrated these three key components: (1) pedagogical models (flexible learning, distributed learning, knowledge building communities); (2) instructional strategies (collaboration, articulation, reflection, role-playing, exploration, problem solving); and (3) pedagogical tools (Internet and Web-based technologies, hypermedia and multimedia tools, course management systems).

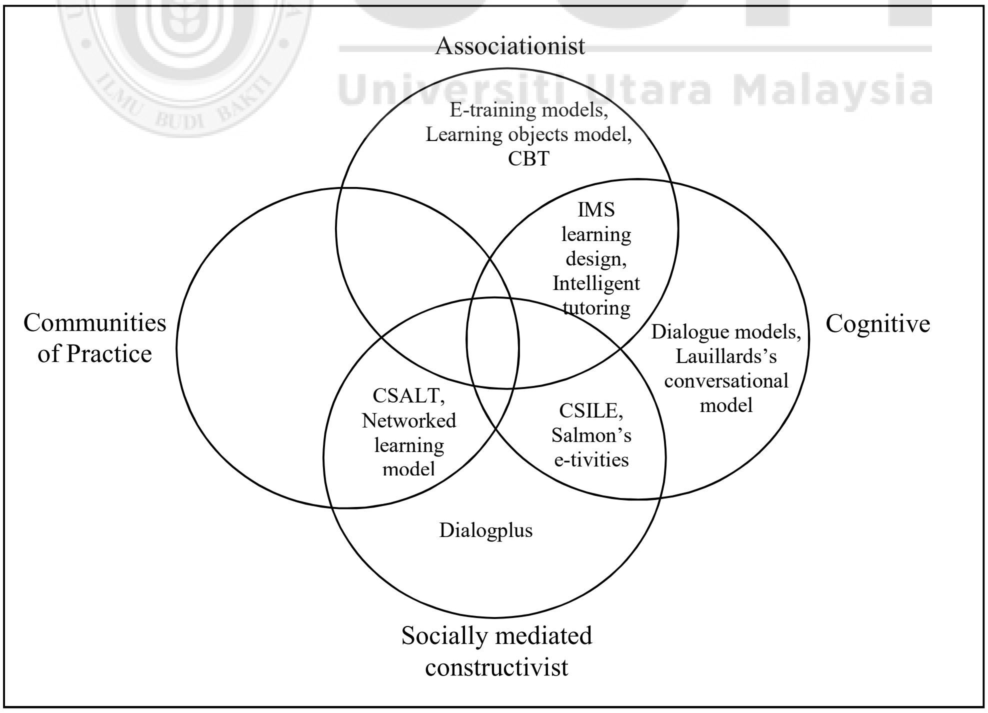


(Source: Dabbagh, 2005)
Figure 2.2. Theory-based design framework for e-learning

In addition, Dabbagh (2005) offers examples of language teaching and learning activities that can be enacted in e-learning context which include:

- using digital audio and video, animation and graphic to promote authentic activities and support role-playing, modeling and explaining processes
- providing synchronous discussion forums, bulletin boards, blogs, and online journals to facilitate problem-solving and promote articulation and reflection
- offering links to online databases and search engines on course website to get additional information and explore support from multiple perspectives
- creating asynchronous discussion forums, video conferencing and shared databases to promote collaboration and social negotiation
- providing scaffolding by having one-on-one mentoring and guidance via email.

Consequently, Mayes and de Freitas (2004) made a review on e-learning theories and frameworks as to describe the assumptions that support the existing practice of e-learning models. Based on the four clusters of e-learning models (focusing on subject matter; individual tasks, formative assessment and dialogue; group tasks and discussion; and building communities of practice) and the three lines of pedagogical thinking (associationist, cognitive and situative perspectives), they presented the e-learning model as shown in Figure 2.3. The framework showed the derivation of principles by including curriculum design model, learning outcomes, teaching and learning activities, and assessments. However, the framework failed to identify an e-learning model that justifies the pedagogy focusing on building communities of practice, and this leads to the requirement of a more evidence-based method to further develop the framework.



(Source: Mayes & de Freitas, 2004)
Figure 2.3. E-learning models within the wider learning theoretical perspectives

A common definition for e-learning is difficult to achieve as researchers defined it focusing on different perspectives like on-line courses, virtual learning environment, on-line tools and on-line learning (Arkorful & Abaidoo, 2015). However, Algahtani (2011) defined e-learning into three perspectives of distance learning, technological and e-learning pedagogy and further classified e-learning into computer-based learning and internet-based learning as shown in Table 2.1. It is noted that e-learning mainly requires the usage of computer operating system through the Internet network as to provide multimedia environment that incorporates various information and supports collaborative communication.

Table 2.1
Classification of e-learning

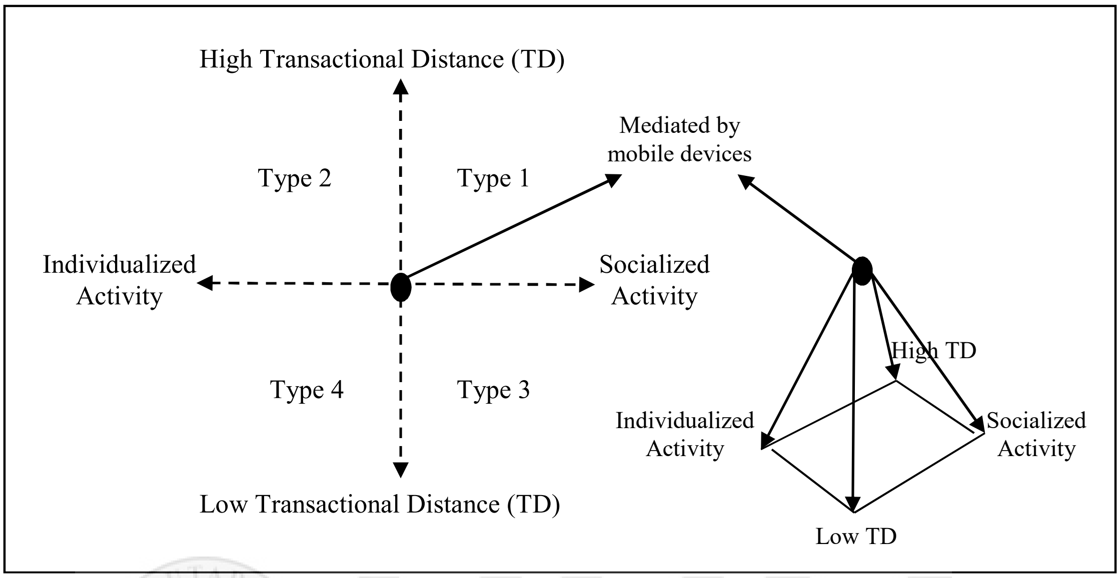
Type of e-learning	Description	Function
Computer-based learning	• a range of hardware and software made available for ICT use • used in two ways: computer-managed instruction and computer-assisted learning	• computer-managed instruction: computers are used to store and retrieve education resources • computer-assisted learning: computers are used to provide interactive software either as a support tool for classroom learning or as a tool for self-learning
Internet-based learning	• content available on the internet with links related to knowledge sources • used in three ways: mixed or blended mode, assistant mode, completely online mode	• mixed or blended mode: offers a short-term program with partly traditional method • assistant mode: supplements traditional method • online mode: uses network either through synchronous or asynchronous timings • synchronous type (online study): same time discussions among learners and instructors via internet (videoconference and chat rooms) • asynchronous type (offline study): different time discussions among learners and instructors via internet (discussion forums, learning management system and emails)

(Source: Algahtani, 2011)

2.3.2 Mobile Learning Pedagogical Models

The introduction of mobile devices into the educational world has led to the evolution of mobile learning. Similar to e-learning, mobile learning is also lacking of solid theoretical framework that can be used to design effective pedagogical approach which relies on the usage of mobile technologies. One of the theories being used to determine pedagogical approach of mobile learning is the Transactional Distance Theory and Moore (1997) asserted that this theory is controlled by three factors: (1) distance learning curricula; (2) teacher and learner communication; and (3) the learner's autonomy. As stated by Jonassen and Rohrer-Murphy (1999), other researchers have also used activity theory as the base for mobile learning framework since it utilizes constructivist learning and student-centered learning environments.

Using Transactional Distance Theory and Activity Theory, Park (2011) proposed a pedagogical framework that identifies mobile learning into four types: (1) high transactional distance and socialized mobile learning activity; (2) high transactional distance and individualized mobile learning activity; (3) low transactional distance and socialized mobile learning activity; and (4) low transactional distance and individualized mobile learning activity (refer Figure 2.4). Based on these types of mobile learning pedagogical framework, Park (2011) offered characteristics and examples of educational applications as shown in Table 2.2. It should be noted that the usage of mobile devices in educational field is made possible through innovative program applications and social software using Web 2.0 technologies (e.g. blogs, Twitter, YouTube) and social networking sites (e.g. Facebook) (Park, 2011).



(Source: Park, 2011)
Figure 2.4. Four pedagogical types of mobile learning

One of the pedagogical implications of mobile devices is the Mobile Assisted Language Learning (MALL) which considers the teaching and learning process that happens via a mobile device away from traditional learning environment (AbuSa'aleek, 2014). Reviews on MALL publications (Bozdogan, 2015; Chwo, Marek, & Wu, 2016) revealed that mobile phones and smart phones are the most preferred mobile device to be used in language learning with emphasis on vocabulary and listening skills. However, the effectiveness of MALL can only be achieved if students and educators have positive experiences with MALL technology (Chwo, Marek, & Wu, 2016).

Table 2.2

Summary on elements of mobile learning pedagogical framework

Types of mobile learning	Characteristics	Role of instructor	Examples
High transactional distance and socialized mobile learning activity	• learners have more psychological and communication space • learners are involved in group learning projects • learning materials are delivered from predetermined program through mobile devices • transactions mainly occur among learners	• focus on the design of mobile application and setup of social interaction	• NetCalc (mathematics) • The MCSCL system (physics) • The Math MCSCL project (arithmetic)
High transactional distance and individualized mobile learning activity	• learners have more psychological and communication space with instructor and instructional support • learners receive structured and well organized resources through mobile devices • learners receive content and control the learning process • interactions occur between learner and content	• focus on the creation and management of a knowledge database (audio and video lecture files, reading materials, vocabulary database)	• Off-campus postgraduate program in Australia National University • TUSK knowledge database (partnership between medical college in India and School of Medicine in U.S.) • literacy program for migrant indigenous children in Latin America • Mobile assisted language learning (MALL)
Low transactional distance and socialized mobile learning activity	• learners have less psychological and communication space with instructor • loosely structured instruction • learners do group work • frequent social interaction, negotiation and communication	• promote active participation and develop meaningful collaborative task	• Environmental Detectives (game simulation) • Audio-based learning forum project

(Source: Park, 2011)

2.3.3 Comparison of Pedagogical Approaches

The concept of teaching and learning has changed tremendously due to the advancement of technologies which makes communication and information transfer could be done across boundaries of time and location. Starting from the traditional way of teaching and learning, pedagogical approaches have evolved into the concept of e-learning and m-learning.

There are pedagogical and communication differences between e-learning and m-learning. For e-learning, it is conducted in restricted locations like the classrooms or in computer labs using fixed wire devices via Internet connections and occurred at a restricted and scheduled time as in lecture hours (Che, Lin, Jang, Lien, & Tsai, 2009; Saleem, 2011). There is also a time shift in e-learning as the learners need to travel to Internet locations and wait for their lecturers to check and reply to their postings (Che *et al*., 2009). In addition, communication channels used in e-learning have low protection levels as learners use more than one device (Saleem, 2011).

In contrast, m-learning can occur when the learner is in mobile (anywhere) with no geographical boundaries and can take place spontaneously at a non-restricted time (anytime) (Che *et al*., 2009). Using wireless communication devices such as mobile phones, the learners can deliver Short Message Service (SMS) and Multimedia Messaging System (MMS) services and the lecturers are able to read and reply to learners' postings immediately (Che *et al*., 2009; Saleem, 2011). Besides that, m-learning provides users with more protection as learners use their own devices to connect with others (Saleem, 2011). Therefore, m-learning increases learners' communication to their peers as well as it allows greater access to immediate and relevant information. Table 2.3 below describes the comparison for the different types of pedagogical approaches as reviewed by several researchers (Behera, 2013; Korucu & Alkan, 2011; Munienge & Muhandji, 2012; Upadhyay & Jaiswal, 2014).

Table 2.3

Comparison of pedagogical approaches

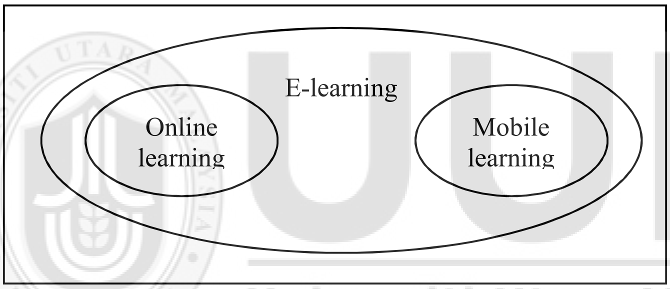
Traditional pedagogy	E-learning pedagogy	M-learning pedagogy
Chalk-and-talk, marker-and-white board, overhead projector transparencies	Computer, laptop computer, internet/intranet connection (bandwidth)	Mobile phone, smart phone, PDA, handheld palmtop, tablet PCs, wireless network (GPRS, 3G and 4G technology, Bluetooth)
Educational information is delivered via face-to-face interaction	Educational material is provided electronically via a web browser	Educational resources are sent and retrieved via portable devices
Teacher as a sender of source and student as receiver of information	Student gets instruction from teacher or student does self-exploration (online and offline mode)	Student receives information and interacts with teacher, peers and interest groups worldwide
Whole class participation; immediate feedback; summative evaluation	Collaborative activities and individual task; lack of immediate feedback in asynchronous mode (time-delayed); diagnostic and standard test	Networked and personal communication; timely present and spontaneous feedback (instant delivery); individualized test
Takes place within the classroom and school	Occurs in-class or location with computer and internet facilities	Not restricted to fixed locations; takes place in all areas with network connectivity
Students learn "what" and not "how"; teacher-directed	Students learn with connection to the real world; learner-directed	Students learn at own pace with a degree of privacy; self-learning
High cost to prepare school facilities and infrastructure	Increased preparation time for teacher; lack of proper equipment (computers) in schools; cost effective for learner	Less cost than computer but device becomes outdated quickly, small size display device

2.4 Mobile Teaching and Learning

The introduction of mobile technology which leads to the wireless type of communication has been extended to the education world into the concept of mobile teaching and learning. These wireless and networked mobile devices can help learners and educators manage the growing amount of information in the world. Effective implementation of mobile teaching and learning requires the preparation on its basic elements which include the learner, teacher, content, environment, and assessment. The learner acts as the center of mobile teaching and learning activities as they fulfill the roles of accessing, creating and sharing information when needed besides discovering and being responsible for their learning styles and speed. The teacher conveys to the learners the information stored in books and other media components using mobile technology support. The element content covers the issues that the learners are expected to learn; environment refers to the situation where learners receive information as in acquiring online content through mobile technologies; and assessment provides the pieces needed to accurately evaluate a learner's knowledge, skills and creativeness (Ozdamli & Cavus, 2011). In addition, the usage of mobile technology device such as mobile phone enables the learner to make phone calls and send texts, surf Internet websites, take pictures and make videos, record and listen to audio scripts which can act as a catalyst to the learning process (Khonat, 2012).

Brown (2005) asserted that mobile learning is a subset of e-learning which refers to teaching and learning activities using Information and Communication Technologies

(ICT) facilities as the learners utilize computers with wired connections to Internet learning sites (Balasundaram & Ramadoss, 2007; Shih, 2007). In addition, e-learning covers a wide range of applications such as computer-based learning, web-based learning, virtual classrooms and digital collaboration (Brown, 2005). Figure 2.5 shows that e-learning is the macro concept that includes online learning and mobile learning. The difference between online learning and mobile learning is that mobile learning provides more mobility, flexibility and convenience than online learning. Thus, mobile learning (m-learning) is actually the concept of e-learning through mobile computational devices.



(Source: Brown, 2005)
Figure 2.5. Subsets of e-learning

2.4.1 Definitions of Mobile Learning

Researchers have produced a variety of definitions on mobile learning (m-learning). It is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Wikipedia, 2015a, p.1). In another view, m-learning is learning that arises in the course of person-to-person mobile communication (Nyiri, 2008). It is any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies

(Sharples, Taylor, & Vavoula, 2005). In addition, m-learning allows the ability to move beyond place-bound teaching and learning environment based on the application or wireless educational technologies (Goh & Kinshuk, 2006; Seppälä & Alamäki, 2003).

In terms of technology, mobile learning is defined as "an extension of e-learning providing smaller learning objects in mobile handheld devices to mobile learners anytime and anywhere they need" (Son, Lee, & Park, 2004, p.3) which means it is a form of learning and teaching that occurs through a mobile device or in a mobile environment. Likewise, it is also defined as "any educational provision where the sole or dominant technologies are handheld or palmtop devices" (Nik Mastura, Mohd Nor, & Posiah, 2009, p.1).

As defined above, the range of devices for mobile learning includes mobile phones, smart phones, personal digital assistants (PDAs), iPods or mp3 players, and handheld computers or Tablet PC (Clarke, Keing, Lam, & McNaught, 2008). Generally, mobile device means any device that is small, autonomous, could be carried everywhere and can be used for some form of learning (Son, Lee, & Park, 2004). On top of that, mobile learning is a type of learning that embraces the widespread of Internet and wireless network systems.

Another aspect that needs to be considered when defining mobile learning is its features. According to Mostakhdemin-Hosseini and Mustajärvi (2003), mobile learning features included independent resources from time and place, authentic users having access to the system, different formats of resources (voice, text, picture and video), re-use of education materials and flexible environment in which other services and components can be added. In another point of view, Shih (2007) classified the attributes of mobile learning into ubiquity, access, richness, flexibility, security, reliability and interactivity. In education, its asynchronous or synchronous collaboration has led to several forms of communication for mobile learning which includes individual basis like phone call or SMS and MMS enabled services, group communication as in telephone conference, forum or video conferencing, and e-mail applications (Cobcroft, Towers, Smith, & Bruns, 2006). As a result, the essential elements of mobile learning would have to encompass educators, students, learning materials, mobile devices and communication system.

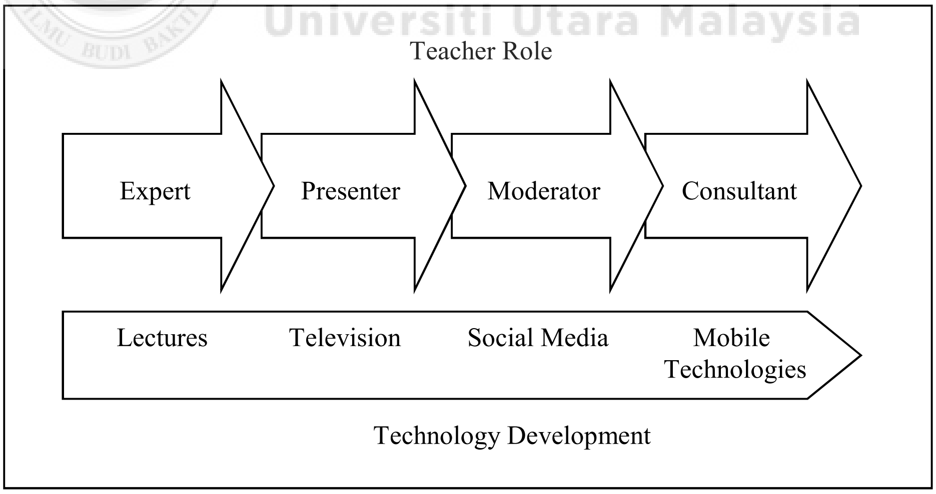
Based on these concepts, the definition of mobile learning for this research would be the spontaneous and mobility process of education which includes teaching and learning through the usage of mobile technology devices. In other words, the portability of mobile learning reduces the limitation of learning location and learning time as the educators can offer educational contents and facilitate communication to their learners via mobile devices.

2.4.2 Teaching Using Mobile Technology

The development of mobile technology has enhanced the amount of teaching and learning activities outside the limitation of classroom environment which has led to the modification of educators' roles in teaching practices. Teaching using mobile devices uniquely offers the educators mobility and functionality opportunities including the creation and delivery of content that are not possible with desktop computers (JISC Digital Media, 2011). Besides, wireless mobile technologies have the potential to enhance communication and interaction between learners and educators by providing an environment that stimulates reflection, critique, collaboration, and user generated content (Cochrane, 2007). However, the key towards the integration of mobile wireless technology into teaching and learning is that the educators need to become models on the educational usage of the technology. As stated by Baggaley (2004), m-learning will not be fully realized until educators learn to m-teaching, obtain a greater understanding of their learner's problems and learn how to deal with the challenges of m-teaching.

In a study conducted by Kearney, Schuck, Burden and Aubusson (2012), they identified specific features of mobile teaching and learning by examining its pedagogical approaches which could help teachers to reflect on their teaching activities and offer critical insights into the design of m-learning materials. The distinctive features characterizing the pedagogy of mobile teaching and learning are authenticity (opportunities for contextualised, participatory, situated learning), collaboration (conversational, connected aspects of m-learning) and personalization (strong implications for ownership, agency and autonomous learning). In order to facilitate learners in using mobile technology for learning purposes, teachers need the knowledge of how learners plan and operate their studying activities. Such awareness permits the teacher to arrange and design educational practices in fulfilling the needs of their learners. Moreover, a research by Sølvberg and Rismark (2012) found that educators should take into account the features of various learning spaces (attending lectures, on-campus activities and off-campus activities) within m-learning environments when they plan student learning and establish teaching practices. They concluded that each learning space shows different features of how the students worked with the course material using different kind of mobile technologies.

The integration of mobile technologies into teaching and learning activities is challenging the teachers' roles and moving them out of the center of the educational process. Referring to Figure 2.6, Glahn (2011) indicated the changes of teacher's roles according to the development of educational technology.



(Source: Glahn, 2011)
Figure 2.6. Teachers' role in technology development

The main role of the teacher when presenting lectures is an expert as the teacher conveys relevant information to the novice learners who need to learn. The transition of media by using television in education changes the role of the teacher into being a presenter of expert knowledge on the learning materials created by television production teams. Glahn (2011) stated that the development of social media such as Web2.0 converts the role of the teacher into a moderator where the teacher needs to "accept different opinions and positions, relate and integrate them, and guide the process of knowledge selection and acquisition". The integration of mobile technologies into education transforms the role of the teacher into a consultant for the learners who want to learn and have greater responsibility for their own learning. At this point, the teacher is required to "identify the learners' interests, relate these interests to topic related to learning goals, and offer opportunities to reach these goals" (Glahn, 2011, p.1).

The usage of mobile technology devices in the process of English language teaching and learning was presented by Alemi (2016) who suggested several methods to develop and enhance the skills of the learners. In order to inspire learners to read, digital texts and electronic books can be accessed through portable devices like smart phones and tablets while many websites are found to provide vast resources of newspapers, magazines, reports, journals, encyclopedias and others. In addition, students can practice and improve their writing skills by sharing ideas and correspond instantly with their teachers through mobile text chatting and e-mails. Speaking ability could also be enhanced by having verbal interface and communication using internet voice chatting (Alemi, 2016) as in WhatsApp application through mobile phone devices.

Developing competence in the use of mobile technology in teaching and learning activities may be perceived as a burden to the educators. However, becoming successful users of the innovations in mobile pedagogical practices requires the educators to be familiar with the mobile technology devices (Alemi, 2016) and develop a level of proficiency (Fan, Radford & Fabian, 2016) before they can be convinced of its potential and nature of use. In addition, they need to identify when and how to use mobile technologies in their teaching activities, select suitable mobile devices for learners to use, and design appropriate learning activities to successfully achieve the learning outcomes (Wishart, 2009). As such, for the purpose of this research, educators who practice teaching using mobile technologies are defined as the persons who integrate mobile devices (i.e. mobile phones) in their teaching instructions by fulfilling the consulting roles of language instructors and ensuring the effectiveness of mobile teaching and learning.

2.4.3 Mobile Technology Devices

The initiation of mobile learning concept into higher learning institutions has generated the interest of the educators towards mobile technology devices. Within a short time, mobile technology devices have undergone tremendous changes starting with the simple early models of mobile phones into the advancement of sophisticated mobile devices. In the beginning, mobile phones had restricted computer abilities and limited battery power. Nowadays, mobile phones have been transformed into smaller electronic devices that support operating system and multimedia platforms, contain high resolution screens, cameras, digital recorders, MP3 players, and comprise of built in functions and capabilities like PDA, global positioning systems (GPS), Bluetooth, Web browsers and Wi-Fi (IEEE 802.11) (Akour, 2009). Even with all these features, these mobile devices are sold at low and affordable prices.

Mobile technology devices consist of portable computers or laptops, mobile phones, smart phones, PDAs, and MP3 devices such as the iPod (Akour, 2009). According to literature, the definition for mobile learning covers the usage of handheld or palmtop devices which are small, autonomous, unobtrusive and could be carried everywhere (Nik Mastura, Mohd Nor, & Posiah, 2009; Son, Lee, & Park, 2004; Trifonova & Ronchetti, 2003). In addition, the feature "wearable" was included to the description of mobile learning devices (de Freitas & Levene, 2003; Livingston, 2004). According to Livingston (2004), the term "wearable" was identified as a device which has become a part of a person's daily necessities as in clothing, can be put in a person's pocket or purse and most likely being kept or carried with the person at all times. Even though computer laptops are considered portable, they do not fit into the characteristics of wearable devices. Therefore, this study excludes the usage of computer laptops in mobile teaching and learning applications.

According to Livingston (2004), higher learning institutions that plan to integrate mobile technology devices could employ mobile phones, PDAs and Digital Audio

Recorders and Players to complement teaching and learning activities. Mobile phones are devices with the features of voice, messaging (whether text or multimedia; voice or video) and various other features like games and calculators. In everyday routines, mobile phones or sometimes referred to as cell phones are widely used by individuals to communicate with other people either by making calls or sending SMS. Mobile phones are also enhanced with the facility of MMS which delivers text, sound, image and video messages. Chinnery (2006) asserted that voice communication in mobile phones can be used for teaching and learning foreign languages through reading, drama, poetry and public speaking activities. On top of that, Prensky (2005) claimed that text messaging can be used in education to facilitate pop quizzes, opinion polls, foreign language practice, games and discussions.

Livingston (2004) made further categorization of mobile phones which comprises of web-enabled phones, extensible phones and smart phones. Web-enabled phones have the standard features of a mobile phone but also include web browsing capabilities through Wireless Application Protocol (WAP) browsers that display and support Wireless Markup Language (WML) content or Hypertext Markup Language (HTML) content. The feature of web-enabled mobility has significantly improved the instructional design of mobile learning besides extensively enhanced the potential of pedagogical and educational opportunities by providing Internet and Web mobile access (Fisher & Baird, 2006).

The next category of mobile phone is extensible phones which also contain the features of web-enabled phones except that these phones also allow downloading and installation of software which are supported through the platforms of Java 2 Micro Edition (J2ME) and Binary Runtime Environment for Wireless (BREW). These platforms allow mobile phone users to work faster, continue working even without Internet connection and do not accrue further charges once the software is downloaded. These platforms can support education applications but its limitation is the storage capacities of the devices (Livingston, 2004).

The third category of mobile phones is the smart phones which embrace the features of extensible phones capabilities like the Internet and e-mail access, but at the same time it also integrates personal management information as in a PDA which includes functions like to-do lists, calendars, contact management books, and notepads that can be synchronized to a computer. The key feature of a smart phone is that it can install additional applications and has the ability to read files in a variety of formats such as Microsoft Office applications (Shih, 2007). This phone permits programs to be downloaded or customized and written by respective institutions. In addition, the configurations of these devices can support high resolution cameras, GPS services, and Wi-Fi systems (Akour, 2009). Examples of smart phone are the introduction of iPhone by Apple which supports touch screens and handwriting recognition and also Blackberry device that supports a full miniature keyboard.

Shih and Mills (2007) asserted that smart phones features can be utilized in the instructional design of mobile learning as these phones increase the motivation and engagement of the students in learning activities. They proposed a model of mobile learning using smart phones which begins with the stage that the educator sends a multimedia message to the students' phones as to generate a learning activity. The students receiving the instruction start performing searches through Internet and Web access based on the topic given by the educator and later they begin discussing the topic among themselves through the mobile phones using text, voice or video communications. After the discussion, the students produce a personal diary of learning via text, audio or video form which is then uploaded to a server and finally they can apply what they had learned through a mobile phone communicated scenario or game.

One of the limitations of mobile phones is the size of the screen (Son, Lee, & Park, 2004) and this has made PDAs become important. PDA is a handheld computing device associated with ubiquitous ownership, ease of use with larger screen size, access to Internet and Web pages, ability to connect to email applications and instant messaging (Kim, Holmes, & Mims, 2005). However, the principal usage for PDA is still for personal management functions like calendaring, observance of to-do lists, and for storing contact information (Cobcroft *et al*., 2006). In addition, the cost of PDA which is more expensive than mobile phone inhibits the students to purchase this device. Studies found that mobile phone has a higher percentage of students' ownership as compared to PDA (Corbeil, Pan, Sullivan, & Butler, 2007; Hayati, Koo, & Song, 2009; Kim & Chung, 2006).

Another type of mobile technology device is the Digital Audio Recorders and Players which is in the category of digital audio or MP3 players like the Apple's iPod. These mobile devices known as podcasts have been added with Radio Frequency Identification (RFID) and were demonstrated for automated data transfer and identification between mobile devices (Akour, 2009). Besides that, Chapin (2009) emphasized that mobile and computer-based MP3 players such as iPods and iTunes are capable of allowing users to create custom audio file playlists that can be saved for later playback. Moreover, podcasts is referred to as a combination of software and hardware that permits automatic downloading of audio files in MP3 format which gives the users control and convenience over what they are listening. This mobile device allows the students to retrieve lectures if they miss class and create their own collection of notes or what they have learned. However, podcast has limited usefulness as it is primarily an audio delivery technology which is not designed for two-way interaction or audience participation (Educause Learning Initiative, 2005).

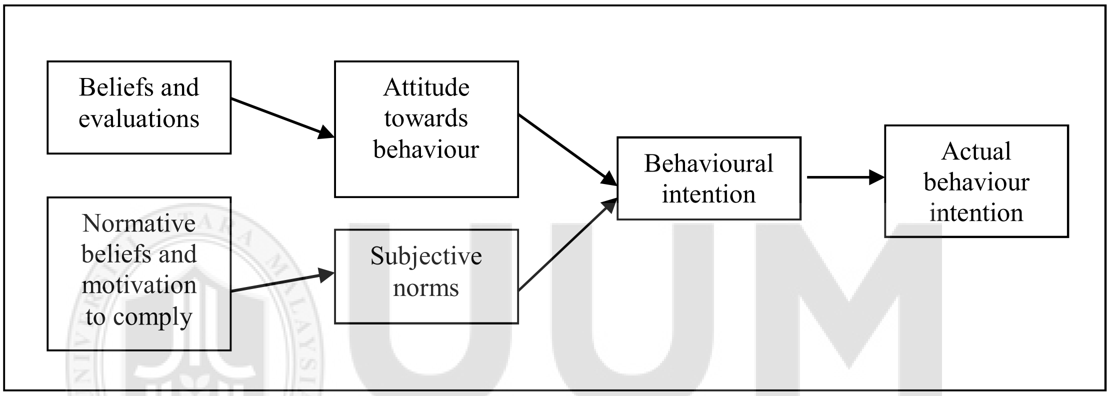
For the purpose of this research, it focuses on personal form of mobile technology which includes mobile phones and smart phones. Other mobile devices such as PDA and iPods are not included because at present, they are not actively used among students in Malaysia (Hayati, Koo, & Song, 2009). In addition, these mobile phones and smart phones represent a high penetration of market users with 43.8 million mobile phone subscribers in Malaysia for the year 2014 (Malaysia Communications and Multimedia Commission, 2014). Realistically, this research only considers mobile phone and smart phone as the device used by educators in their intention to adopt mobile technology in teaching and learning processes.

2.5 User Acceptance Models

Various theoretical models have been developed in order to understand the determinants of information technology end-user's behaviours toward information technologies which include Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Diffusion of Innovation Theory (DIT), Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM). Among these theories and models, Technology Acceptance Model (TAM) is regarded as "the most widely accepted theory among information systems research for studying users' system acceptance behaviour" (Liu, Liao, & Peng, 2005, p.176). This section reviews the related theories and models on user acceptance of information technology and discusses specifically on TAM, the studies conducted using TAM and the variables comprising these models.

2.5.1 Theory of Reasoned Action (TRA)

Theory of Reasoned Action (TRA) was developed by Fishbein and Ajzen (1975) that explained the determinants of intended behaviours. Figure 2.7 presents TRA model that posits behavioural intention is determined by a person's attitude and subjective norm concerning the behaviour. Behavioural intention is a person's subjective probability that the behaviour will be performed while attitude is defined as "a person's general feeling of favorableness or unfavorableness toward some stimulus object" (Fishbein & Ajzen, 1975, p.216). In contrast, subjective norm refers to "a person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen, 1975, p.302).

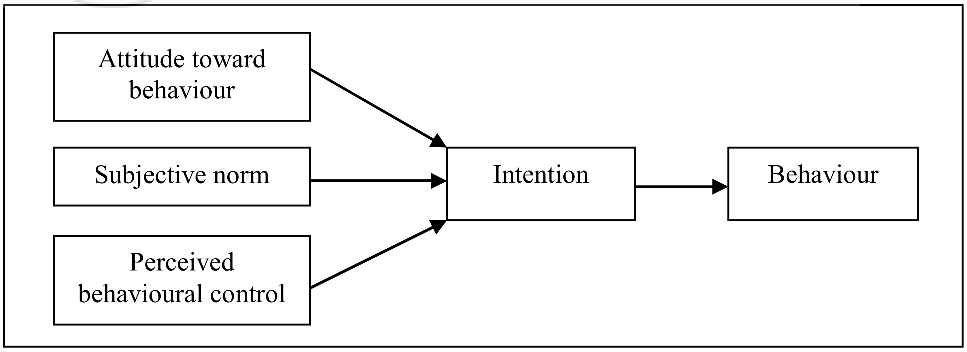


(Source: Davis, Bagozzi & Warshaw, 1989)
Figure 2.7. Theory of Reasoned Action (TRA)

The model on TRA has been extensively used in applied research to explain and predict behaviours concerning the use of information system (e.g. Wok & Gao, 2005; Nasri & Charfeddine, 2012). As such, TRA was found to be remarkably robust in predicting choices and offering strong predictive utility (Sheppard, Hartwick, & Warshaw, 1988). However, Ajzen and Fishbein (1980) (as cited in Maslin & Ramlah, 2008) concluded that TRA is rather general because it does not identify the beliefs that control a particular behaviour and it can only be applied to predict situations with no specific barriers to behavioural performance.

2.5.2 Theory of Planned Behaviour (TPB)

Theory of Planned Behaviour (TPB) was developed by Ajzen (1991) which is an extension of TRA due to its limitation in dealing with behaviours over which people have incomplete volitional control. The model adds a third antecedent of intention that is perceived behavioural control to the original model of TRA. Figure 2.8 depicts TPB model that shows intention is determined by three constructs namely attitude toward behaviour, subjective norms and perceived behavioural control, which in turn affects behaviour. Perceived behavioural control refers to people's perception of the ease or difficulty of performing the behaviour of interest and is closely linked to self-efficacy belief concept (Ajzen, 1991). Bandura (1982) claimed that an individual needs to be confident as to perform the behaviour and this relates to self-efficacy beliefs which actually influence the choice, preparation and effort to perform the activity as well as the person's thought patterns and emotional reactions.



(Source: Ajzen, 1991)
Figure 2.8. Theory of Planned Behaviour (TPB)

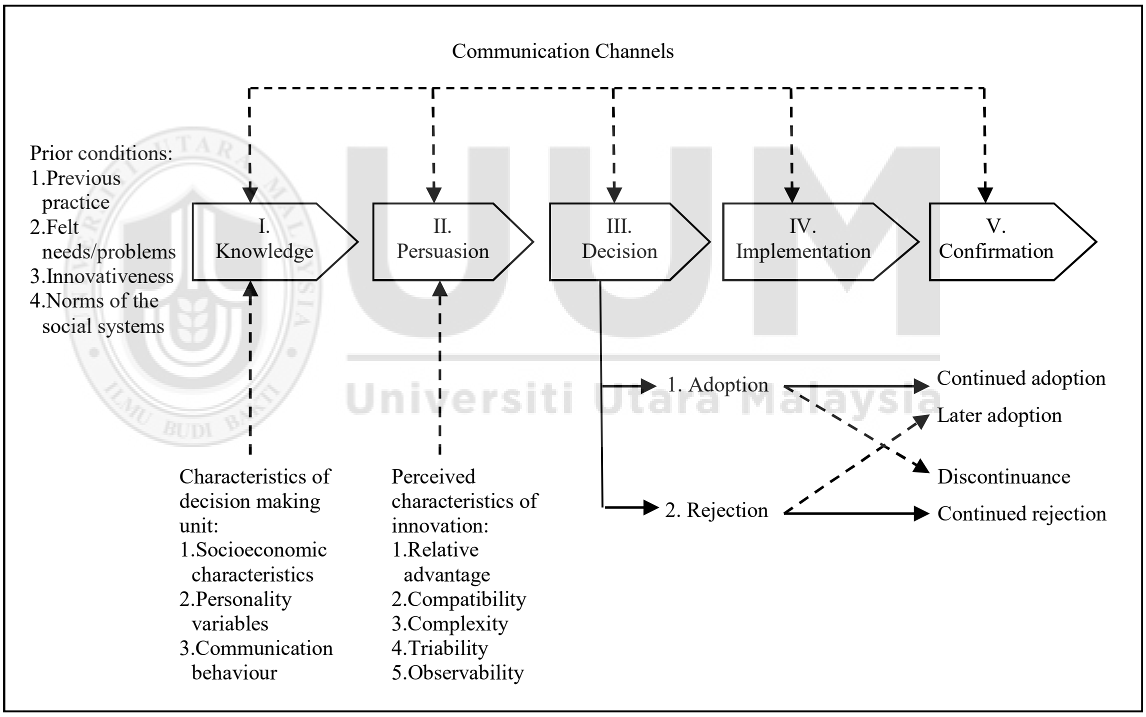
This theory has achieved considerable success in various studies to predict intention and behaviour (e.g. Lee, Cerreto, & Lee, 2010; Ramayah, Yusliza, Norzalila, &

Amlus, 2009) even though arguments on the insufficiency of TPB constructs to fully explain individual's intentions and actions were presented (Armitage & Conner, 2001). As such, Ajzen and Fishbein (2005) suggested the addition of one or more predictors by considering various behaviour-specific constructs to improve the prediction of intentions.

2.5.3 Diffusion of Innovations Theory (DIT)

Diffusion of Innovations Theory (DIT) was introduced and popularized by Rogers in 1962 which relied upon theories of sociology, psychology and mass communications to develop an approach to consumer acceptance of new technologies. Diffusion is defined as "the process by which an innovation is communicated through certain channels over time among the members of a social system" while an innovation is "an idea, practice or object perceived as new by an individual or other unit of adoption" (Rogers, Singhal, & Quinlan, 2009, p.418). Furthermore, the difference between adoption and diffusion is that adoption relates to an individual process of going through the stages of adopting the technology while diffusion denotes a process that signifies a group of phenomena as how an innovation spreads among consumers. As such, diffusion is actually a process that includes the adoption process of individuals (Rogers, 2003).

Rogers (2003) described the innovation-diffusion process into five stages involving (1) knowledge, (2) persuasion, (3) decision, (4) implementation and (5) confirmation as presented in Figure 2.9. In the knowledge stage, the person is exposed to innovation and seeks information to determine what the innovation is and how it works. Persuasion stage happens when the person forms a negative or positive attitude toward the innovation after seeking the information about the innovation. This continues to the decision stage as the person chooses whether to adopt or to reject the innovation. In the implementation stage, the person employs the innovation and determines the usefulness of the innovation. Lastly, the person reaches the confirmation stage by reinforcing the decision to continue using the innovation through the support of adoption (Sahin, 2006).

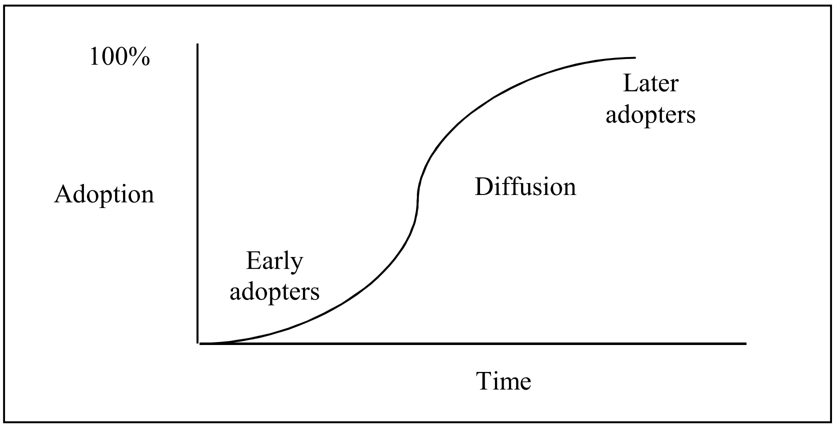


(Source: Rogers, 2003)
Figure 2.9. A model on five stages in the innovation-decision process

Since innovation-distribution process involves a person's decision whether to adopt or reject the innovation, Rogers (2003) has listed five characteristics of innovations that could influence the person's rate of adoption which include (1) relative advantage, (2) compatibility, (3) complexity, (4) observability and (5) triability. Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p.229) which means the state of improvement of an innovation over the previous generation. As such, Sahin (2006) suggested the element of cost through financial incentives been given to individuals to support the adoption of innovation. Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p.15). This means that if the innovation is compatible with a person's need, the adoption rate will increase as the level of uncertainty is decreased. Next, Rogers (2003) defined complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p.15) which denotes that if the person feels the innovation is difficult to use, the person is unlikely to adopt the innovation. Triability refers to "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p.16) which suggests that if the person is able to test the innovation, then the rate of adoption will be higher. Lastly, Rogers (2003) described observability as "the degree to which the results of an innovation are visible to others" (p.16). Due to this, the key to successful adoption is to ensure that the innovation is apparent and visible through role-modeling as this will create communication network among the members of the organization.

Rogers (2003) also suggested that adopters of innovation are divided into five categories which are (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. Innovators are the first persons willing to take the challenge of adopting the new technology and they are usually young, sociable, risk takers and have financial resources. They are also able to understand and apply knowledge of innovation besides being able to overcome the degree of uncertainty of the innovation. Early adopters are the second group of people to adopt new technology and they tend to be opinion leaders among other adopter categories. They are respected by their peers and become role models for other members in the society to adopt the innovation. Early majority are individuals who adopt the new technology after a varying degree of time as they seldom hold positions of opinion leadership but have strong connections within the system's interpersonal networks. Late majority tend to adopt technology due to economic or social reasons especially after majority of the society have adopted it and usually they are rather skeptical, cautious and have limited financial resources. The laggards are the last individuals to adopt the technology as they typically tend to be focused on traditions and become suspicious of innovations. They are likely to have the lowest financial resources or little access to innovation information besides being the oldest member of all other adopters (Rogers, 2003).

The theory also predicts the spread of diffusion process which is postulated to follow an S-shaped curve as shown in Figure 2.10. It is noted that at a certain point in the diffusion process, the rate of adoption begins to suddenly increase at an inordinate rate and eventually reach the saturation level (Rogers, Singhal, & Quinlan, 2009).



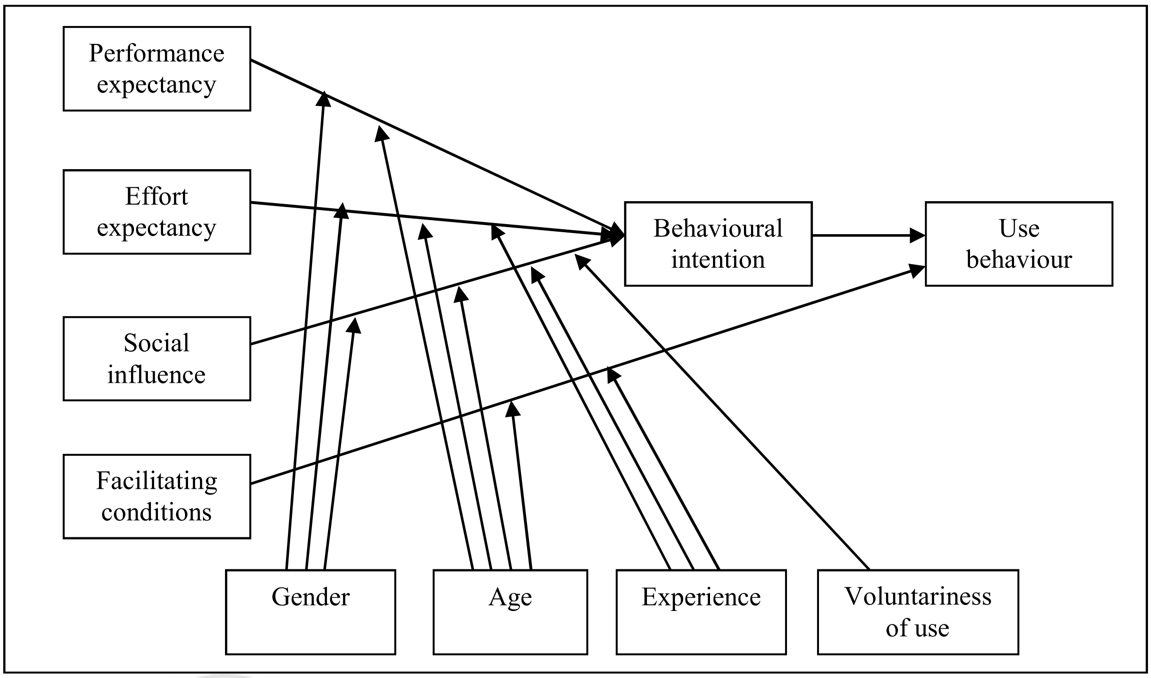
(Source: Rogers, Singhal & Quinlan, 2009)
Figure 2.10. The diffusion S-curve

Even though Rogers' main applications of his theory involve agricultural and medical practice, DIT has also been adapted in information technology research (e.g. Lee, Hsieh, & Hsu, 2011; Moore, 1987; Normah, Faridah, Wan Amizah, Fauziah, Chang, & Maizatul Haizan, 2011). The practical importance and its applied nature of diffusion research continue to flourish but some researchers have suggested improvements toward this theory. Meyer (2004) highlighted the overwhelming sources of quantitative data and proposed alternative methodological approaches such as quasi-experimental field studies and the integration of qualitative methods to maximize information on the adoption of innovation. In addition, Lyytinen and Damsgaard (2001) concluded that DIT failed to offer adequate theoretical constructs of how complex networked technologies (i.e. electronic data interchange) will diffuse among its adopters. Thus, they suggested researchers to analyze the nature and impact of technology, the role of institutional policies towards innovation, and the importance of instilling the innovation in an organization.

2.5.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

The formulation of Unified Theory of Acceptance and Use of Technology (UTAUT) began when Venkatesh, Morris, Davis and Davis (2003) reviewed and discussed eight prominent models of information technology acceptance research. The eight models reviewed were TRA, TAM, Motivational Model, TPB, the combined model of TAM and TPB, the model of PC utilization, DIT, and Social Cognitive Theory. Venkatesh *et al*. (2003) analysed data from four organizations using the eight models and also tested the data with the UTAUT model. The results showed that UTAUT outperformed the other eight models by explaining 69 percent of the variance in intention as compared to only 17 percent to 53 percent for the other models. As such, the integration of elements from the eight models which produces UTAUT was found to be practical in assessing individual acceptance of technology.

UTAUT model comprises of four core determinants of information technology use behaviour along with four moderators of key relationships (Venkatesh *et al*., 2003) as presented in Figure 2.11. UTAUT hypothesizes that performance expectancy, effort expectancy, social influence and facilitating conditions are determinants of behavioural intention or use behaviour, while gender, age, experience and voluntariness of use have moderation effects in the acceptance of technology.



(Source: Venkatesh et al., 2003)
Figure 2.11. Unified Theory of Acceptance and Use of Technology (UTAUT)

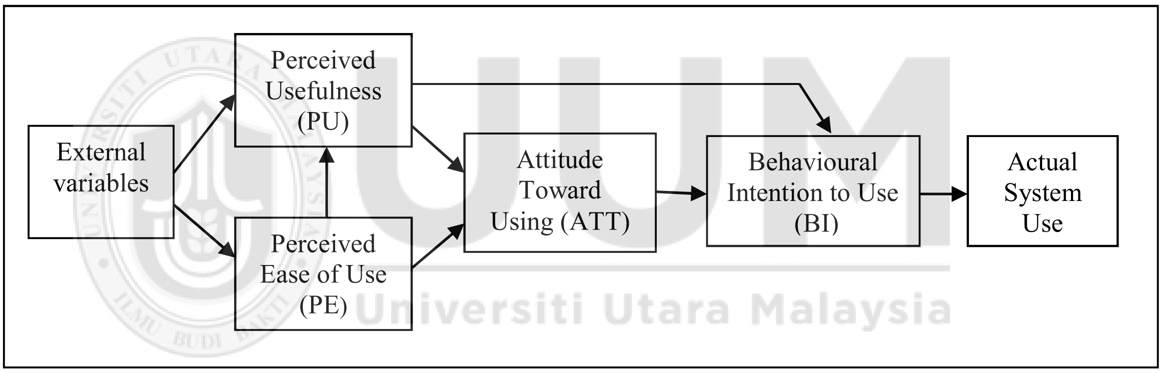
Venkatesh *et al*. (2003) defined performance expectancy as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p.447) while effort expectancy referred to "the degree of ease associated with the use of the system" (p.450). Social influence was described as "the degree to which an individual perceives that important others believe he or she should use the new system" (p.451) and the construct facilitating conditions referred to "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (p.453). From the results' analysis, Venkatesh *et al*. (2003) concluded that performance expectancy, effort expectancy and social influence are direct determinants of behavioural intention whereas facilitating conditions and behavioural intention are direct determinants of usage behaviour. They also noted that the moderators significantly influence most of the key relationships which suggests that research in user technology acceptance should consider examining the potential moderation effects (Sun & Zhang, 2006).

The emergence of UTAUT has led to studies integrating the model within the field of information technology adoption and diffusion especially focusing on education settings (e.g. Jackman, 2014; Khechine, Lakhal, Pascot, & Bytha, 2014; Ktoridou & Eteokleous, 2010; Manimekalai, 2013; Williams, 2010). Even though UTAUT has become a popular theoretical choice in citations, systematic review on research using UTAUT revealed that most studies mainly described UTAUT in their discussion of technology acceptance theories rather than actually utilising UTAUT constructs, and most research only partially used UTAUT constructs while some studies employed UTAUT without including the moderator factors (Williams, Rana, Dwivedi, & Lal, 2011). In addition, students were utilized as respondents in most of these studies (Jackman, 2014; Khechine, *et al*., 2014; Manimekalai, 2013) which could affect the analysis of moderation effects.

2.6 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) as in Figure 2.12 originated from TRA and TPB which was initially proposed by Davis (1989) to explain computer-usage behavior. The model considers that behavioural intention (BI) which acts as the dependent variable as its major determinant and is jointly influenced by the user's attitude (ATT) and perceived usefulness (PU). In addition, two independent variables of perceived usefulness (PU) and perceived ease of use (PE) have been hypothesized to have influence on individual's attitude. In other words, ATT was included as a mediating factor between the two variables and BI. PE of a system also has an effect on PU.

According to Davis (1989), perceived usefulness was defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" while perceived ease of use referred to "the degree to which a person believes that using a particular system would be free of effort" (p.320).

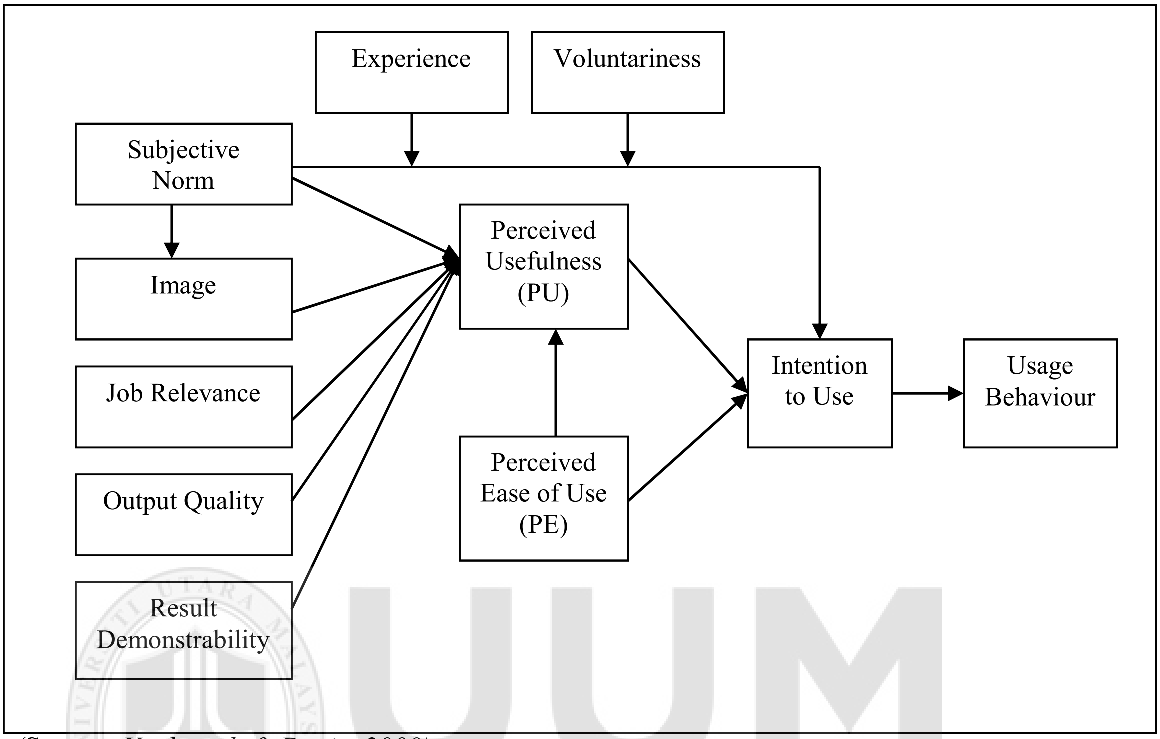


(Source: Davis, Bagozzi & Warshaw, 1989)
Figure 2.12. Technology Acceptance Model (TAM)

Based on two studies (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989), they concluded that PU and PE were significantly correlated with BI, but PU was found to have a stronger correlation than PE. They argued that the user would not consider the technology as easy to use if it was not perceived as useful or the system did not help to improve job performance. It was also believed that PE acts as an antecedent to PU rather than a direct determinant to BI. In addition, it was found that ATT partially mediates the variables PU and PE on BI. Other research on technology acceptance had also excluded the variable ATT from the structural model of TAM due to the reason that it only partially mediated the BI to use a certain type of technology (Davis, Bagozzi, & Warshaw, 1989). Even though PU and PE provided essential roles towards ATT, the relationship between ATT and BI was insignificant for non-student sample (Yousafzai, Foxall & Pallister, 2007). In addition, a review on previous studies by Kim, Chun and Song (2009) found mixed-results on the role of ATT, with a noticeable finding that ATT produced partial or no mediation results for studies comprising of new technology and inexperienced users. The exclusion of ATT is also supported through a review by Marangunic and Granic (2015) who proposed directions for future TAM research. Thus, this study also drops the construct ATT from the proposed research model. On top of that, the findings on TAM have led other research to apply this model either by adapting the original version or extending it with various variables in order to investigate user acceptance on other types of technology.

2.6.1 Extended Model on Technology Acceptance Model

Due to its reliability, TAM has been recognized to test the user acceptance of technology. Following to that, an extended model of TAM was developed by Venkatesh and Davis (2000) which was called TAM2. Similar to TAM, this model claimed that PE and PU determine the user's intention to use technology but included external variables that influence PU. These external variables included subjective norms, image, job relevance, output quality and result demonstrability as shown in Figure 2.13. In addition, experience and voluntariness were added as moderator factors of SN.



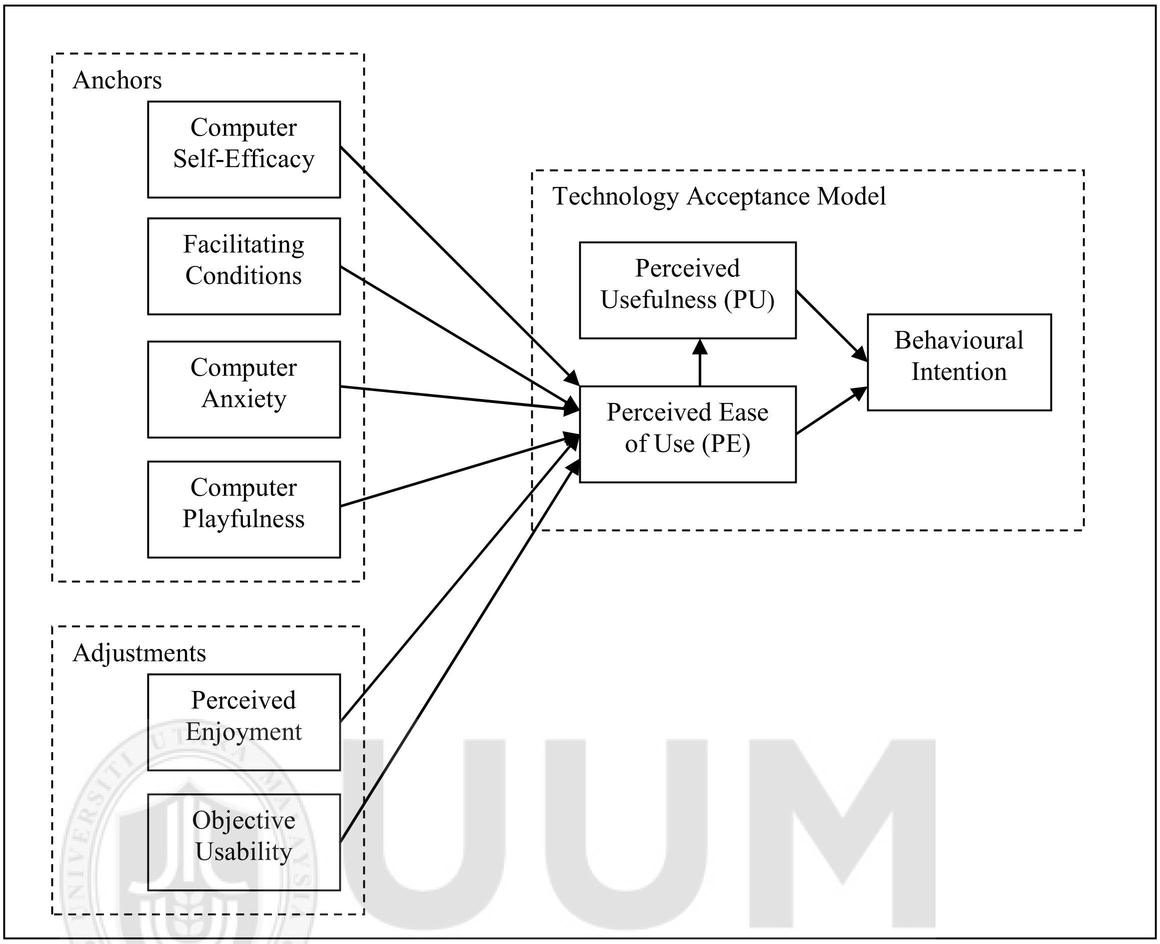
(Source: Venkatesh & Davis, 2000)
Figure 2.13. Technology Acceptance Model 2 (TAM2)

The model TAM2 was generated to identify external variables that influence PU. The variables included subjective norms, image, job relevance, output quality and result demonstrability. Subjective norm is a construct taken from TRA which refers to the influence of other people towards the user's decision as to use or not use the technology (Fishbein & Ajzen, 1975). Meanwhile, the construct image which denotes the user's desire to maintain his or her status among others and the construct result demonstrability which is defined as the "tangibility of the results of using the innovation" (p.203) are drawn from the work of Moore and Benbasat (1991). In addition, Venkatesh and Davis (2000) defined job relevance as "individual's perception regarding the degree to which the target system is applicable to his or her job" (p.191) and output quality indicated the degree to which the technology adequately performs the required tasks. Besides that, the moderator variable voluntariness is defined as "the extent to which potential adopters perceive the adoption decision to be non-mandatory" (Venkatesh & Davis, 2000, p.188) while experience means the understanding and knowledge of the user gained from using the technology.

Venkatesh and Davis (2000) administered a longitudinal study using TAM2 to investigate employees' usage of a Windows system in voluntary and mandatory situations. The extension of TAM2 from the original TAM explains PU and usage intentions in terms of social influence process (subjective norms, voluntariness and image) and cognitive instrumental process (job relevance, output quality, result demonstrability and PE). They discovered that experience significantly moderates the effect of subjective norm on PU while job relevance and output quality significantly influence PU. However, image has no significant relationship with PU. On top of that, this model has increased the variance of PU to 60 percent and intention to use to 52 percent.

Another extension on the TAM model was also presented by Venkatesh (2000) who included the external variables of PE. He proposed the anchor variables of computer self-efficacy, facilitating conditions, computer anxiety and computer playfulness; and adjustment variables of perceived enjoyment and objective usability as shown in

Figure 2.14. Computer self-efficacy and facilitating conditions are proposed based on the concept of control; computer playfulness is derived from intrinsic motivation while computer anxiety is conceptualized from emotion aspect. These anchoring and adjustment perspectives are used to explain the determinants of PE. According to Venkatesh (2000), computer self-efficacy represents "one's belief about her/his ability to perform a specific task/job using a computer" (p.347); facilitating conditions is related to the user's external control which includes the availability of support staff in an organization in order to help the user overcome the barriers of using the technology; computer anxiety is "an individual's apprehension or fear when she/he is faced with the possibility of using computers" (p.349); computer playfulness is related to "the spontaneity in an individual's interaction with computer" (p.349); perceived enjoyment means "the extent to which the activity of using a system is perceived to be enjoyable in its own right aside from any performance consequences resulting from system use" (p.351) and objective usability is termed as "a construct that allows a comparison of systems on the actual level of effort required to complete specific tasks (pp.350-351).



(Source: Venkatesh, 2000)
Figure 2.14. Model on the determinants of perceived ease of use

To test the model, Venkatesh (2000) performed three longitudinal studies using employees from different organizations who were introduced to new computer systems. Results showed that there was significant support for the model and it explained 60 percent of the total variance in PE. This means that when employees form PE of a new system, they would consider computer self-efficacy, facilitating conditions, computer anxiety and computer playfulness as the anchor factors. Meanwhile, when the users gain experience in using the system, perceived enjoyment and objective usability serve as adjustment factors but computer self-efficacy and facilitating conditions were still found to be stronger determinants of PE.

Besides the extension of TAM studies done by Venkatesh and Davis (2000) and Venkatesh (2000), other researchers have also made efforts to introduce new variables to act as antecedents of the PE and PU major constructs of TAM. The next session reviews the external variables used in TAM research.

2.6.2 External Variables of TAM

The major variables of TAM are PU, PE, BI and actual usage of the technology. In addition to these constructs, Lee, Kozar and Larsen (2003) reviewed the research on TAM and discovered that a number of external variables have been used to investigate users' intention to adopt technology. These external variables include accessibility, computer anxiety, computer attitude, compatibility, complexity, result demonstrability, perceived enjoyment, end user support, prior experience, facilitating conditions, image, job relevance, management support, computer playfulness, personal innovativeness, relative advantage, self-efficacy, social influence/subjective norms, social presence, system quality, trialability, objective usability, visibility, and voluntariness.

From the review of one hundred and one articles on TAM published between 1986 and 2003, Lee, Kozar and Larsen (2003) analysed the results and found that these external variables produced either significant, insignificant or mixed relationships with the major TAM variables as given in Table 2.4.

For the PU construct, the relationships found were significant (complexity, computer attitude, image, job relevance, management support, perceived enjoyment, prior experience, result demonstrability, social presence and system quality), insignificant (computer anxiety and facilitating conditions) and mixed (accessibility, end user support, self-efficacy and social influence/subjective norms). Likewise, PE also had significant (accessibility, computer playfulness, management support, perceived enjoyment, prior experience, social influence/subjective norms and system quality), insignificant (computer anxiety and facilitating conditions) and mixed results (end user support, objective usability, computer attitude and self-efficacy). In comparison to BI construct, compatibility, computer playfulness, end user support, management support, personal innovativeness, prior experience and self-efficacy had positive relationships; facilitating conditions and image had negative relationships; while social influence/subjective norms, trialability, visibility, result demonstrability and voluntariness produced mixed results. Only several external variables were used to investigate the relationship with the actual usage of technology which were management support, perceived enjoyment, prior experience, relative advantage and system quality (significant); compatibility (insignificant); complexity and social influence/subjective norms (mixed relationships).

Table 2.4

Relationships between external variables and TAM major variables

External Variables	Relationships with Major TAM Variables	
Management support	PU	Significant
	PE	Significant
	BI	Significant
	U	Significant
Prior experience	PU	Significant
	PE	Significant
	BI	Significant
	U	Significant
Social influence /subjective norms	PU	Mixed
	PE	Significant
	BI	Mixed
	U	Mixed
End user support	PU	Mixed
	PE	Mixed
	BI	Significant
Facilitating conditions	PU	Insignificant
	PE	Insignificant
	BI	Insignificant
Self-efficacy	PU	Mixed
	PE	Mixed
	BI	Significant
Perceived enjoyment	PU	Significant
	PE	Significant
	U	Significant
System quality	PU	Significant
	PE	Significant
	U	Significant
Accessibility	PU	Mixed
	PE	Significant
Computer anxiety	PU	Insignificant
	PE	Insignificant
Computer attitude	PU	Significant
	PE	Mixed
Image	PU	Significant
	BI	Insignificant
Result demonstrability	PU	Significant
	BI	Mixed

Complexity	PU	Significant
	U	Mixed
Computer playfulness	PE	Significant
	BI	Significant
Compatibility	BI	Significant
	U	Insignificant
Job relevance	PU	Significant
Social presence	PU	Significant
Objective usability	PE	Mixed
Personal innovativeness	BI	Significant
Trialability	BI	Mixed
Visibility	BI	Mixed
Voluntariness	BI	Mixed
Relative advantage	U	Significant

(Source: Lee, Kozar & Larsen, 2003)

From these findings, it can be noted that self-efficacy, social influence/subjective norms, accessibility, computer attitude, result demonstrability, complexity, objective usability, trialability, visibility, voluntariness and end user support produced mixed results on either PU, PE or BI constructs. Further studies should be conducted to investigate these external variables in TAM which could then confirm its relationship with the selected TAM variables.

In addition, a recent review by Marangunić and Granic (2015) was made based on 85 TAM publications from 1986 onwards which proposed possible future directions for TAM. Among the suggestions, they recommended that TAM research should include the moderator role of individual variables (e.g. emotional factors like computer anxiety), incorporate additional variables to the model (e.g. cultural differences and gender), and examine the target group of older adults using new technologies (e.g. mobile devices). As a result, this research also considers the suggestions made through the integration of moderator and additional variables.

2.7 Studies on Mobile Learning

Research in the field of mobile learning is on the rise and no longer considered as in the beginning stage. Due to the increase development and diffusion of mobile technologies, it has also rapidly increased the concept of mobile teaching and learning into the education world. This has led to the studies related to mobile learning that focuses on different perspectives which includes studies of mobile learning framework (e.g. Adesope, Olubunmi, & McCracken, 2007; Barker, Krull, & Mallinson, 2005; Goh & Kinshuk, 2006; Parsons, Ryu, & Cranshaw, 2007; Sharples, Taylor, & Vavoula, 2005), users' perceptions (e.g. Abachi & Muhammad, 2014; Al-Husain & Hammo, 2015; Barreh & Zoraini Wati, 2015; Eteokleous & Ktoridou, 2009; Fan, Radford, & Fabian, 2016; Hayati, Koo, & Song, 2009; Issham, Siti Fatimah, Siti Norbaya, & Nizuwan, 2013; Kafyulilo, 2014; Kim & Chung, 2006; Simonova, 2016; Supyan *et al*., 2012; Syvanen, Nokelainen, Pehkonen, & Turunen, 2004; Venkatesh *et al*., 2006), system applications (e.g. Che *et al*., 2009; Corbeil *et al*., 2007; Costabile, De Angeli, Lanzilotti, Ardito, Buono, & Pederson, 2008; Junior & Coutinho, 2008; Pirasteh & Mirzaeien, 2015; Pritchett, Wohleb, & Pritchett, 2013; Shen, Wang, & Pan, 2008; Vogel, Kennedy, & Kwok, 2009; Wang, Shen, Novak, & Pan, 2009), and language learning (e.g. Arani, 2016; Brown, 2008; Chen, 2014; Chen & Hsu, 2008; Hsu, Hwang, Chang, & Chang, 2013; Kimura, 2009; Kimura &

Shimoyama, 2009; Lin, 2014; Mariam & Woollard, 2012a; Md Masudul & Tan, 2012; Pirasteh & Mirzaein, 2015; Thornton & Houser, 2005).

2.7.1 Mobile Learning Framework

Several researchers have proposed frameworks of mobile learning in order to maximize its implementation among mobile users. Adesope, Olubunmi and McCracken (2007) implied that for Africa to adopt mobile learning effectively, it has to consider its learning theory by shifting towards collaborative learning and providing training to the facilitators. In addition, government support is needed to provide funds as to increase its technology infrastructure. A holistic model for mobile learning was also proposed by Barker, Krull and Mallinson (2005) which comprised of communication infrastructure and learning institution as the basis towards mobile learning environment. In this model, learning institution integrated the role of teachers, learners, support staff and parents in adopting mobile learning.

In a framework presented by Sharples, Taylor and Vavoula (2005), the implementation of mobile learning was mediated by knowledge and technology. This process takes into account the technological perspective and the human perspective of social conventions. Likewise, Parsons, Ryu and Cranshaw (2007) listed the perspectives of generic mobile environment, learning context, learning experience, and learning objectives as their framework for mobile learning applications. In generic mobile environment, communication support leads into collaboration learning context which then directs into the experience of mobile learning. On top of that, Goh and Kinshuk (2006) proposed the framework of mobile learners which includes the dimensions of content, user, device, connectivity and coordination. Pedagogy which refers to the study of teaching methods is one of the aspects being emphasized in the content dimension.

From the frameworks of mobile learning adoption, it is found that one of the criteria to ensure the success of mobile learning is the inclusion on the role of teachers or educators. In other words, if mobile teaching and learning is to be implemented in schools or in higher learning institutions, the academics should be the initial persons to be able to adopt and use mobile devices in the learning and teaching processes. Thus, this research focuses on the academics or the educators as its unit of analysis in investigating the intention to adopt mobile technology.

2.7.2 Users' Perceptions on Mobile Learning

Research was conducted to investigate students' level of interest and perception towards mobile learning. Venkatesh *et al*. (2006) explored students' perceptions in India on their readiness in implementing mobile learning through survey and focus group approaches. They found that only 33 percent showed an interest in this type of learning even though nearly 90 percent of the students own mobile phones. In addition, Hayati, Koo and Song (2009) surveyed students in Malaysia on their perceptions towards mobile learning and the results show that majority of the students indicate mobile learning as appealing, fun, interesting and supportive. On top of that, Supyan *et al*. (2012) study concluded that students from Malaysian higher learning institutions had high levels of computer skills and they are ready to embrace the integration of mobile learning in education.

Research regarding the students' level of interest and experience in mobile learning was also conducted and these studies found that students were ready and in favour of using mobile learning in achieving their learning outcomes (Abachi & Muhammad, 2014; Al-Husain & Hammo, 2015; Barreh & Zoraini Wati, 2015). Studies were also done to identify the types of mobile devices that students use including the benefits and problems they face when using these devices in their learning environment (Fan, Radford, & Fabian, 2016; Kim & Chung, 2006). Findings revealed that most students possess mobile devices like notebooks (Simonova, 2016) and smart phones (Fan, Radford, & Fabian, 2016) and they used these devices for communication and learning the English language (Simonova, 2016).

Studies were also conducted to identify the teachers' readiness towards the use of mobile phone in teaching and learning, but they concluded that the teachers were skeptical towards m-learning (Issham *et al*., 2013) and were against of using mobile phone in classrooms (Kafyulilo, 2014). Another study examined the perceived benefits and barriers of mobile learning and concluded that faculty members have mixed reactions towards mobile learning due to the lack of understanding regarding the integration of mobile devices in teaching and learning practices (Eteokleous & Ktoridou, 2009). Furthermore, Syvanen *et al*. (2004) performed a SWOT analysis on mobile learning in which the Finnish and international experts of mobile learning emphasized the role of the instructor as one of components in their future views of mobile learning. As such, Kafyulilo (2014) recommended that educators undergo professional development programme in order to develop a positive attitude towards mobile learning.

Some of these studies commonly used the focus group technique and interview sessions to gather data on the users' perceptions towards mobile learning (e.g. Kafyulilo, 2014; Syvanen *et al*., 2004; Venkatesh *et al*., 2006) while other studies used the survey method to achieve their findings (e.g. Al-Husain & Hammo, 2015; Barreh & Zoraini Wati, 2015; Hayati, Koo, & Song, 2009; Issham *et al*., 2013; Kim & Chung, 2006; Md Masudul & Tan, 2012; Supyan *et al*., 2012; Venkatesh *et al*., 2006). However, the respondents for those research were mainly students (e.g. Al-Husain & Hammo, 2015; Barreh & Zoraini Wati, 2015; Hayati, Koo, & Song, 2009; Hsu *et al*., 2013; Kim & Chung, 2006; Supyan *et al*., 2012; Venkatesh *et al*., 2006) and only few research was found to investigate the educators' interest and perception towards mobile learning (e.g. Eteokleous & Ktoridou, 2009; Issham *et al*., 2013; Kafyulilo, 2014; Syvanen *et al*., 2004) especially in Malaysia .

At present, there is limited information available on mobile learning studies especially those which focused on the educators' perception on the usage of mobile technology in higher learning institutions. Therefore, since this field is new, it is hoped that this research adds literature to the concept of mobile learning especially in the context of educators' perception and adoption towards mobile technology.

2.7.3 Applications of Mobile Learning

Mobile learning provides a variety of activities which can be as simple as SMS to as sophisticated such as sending multimedia pictures. Studies have found that students and educators mainly use the mobile devices to send SMS (e.g. Junior & Coutinho, 2008; Shen, Wang, & Pan, 2008) and e-mail applications (e.g. Corbeil *et al*., 2007). This usage in education demonstrates a positive attitude towards mobile learning. Using this application, several researchers have developed mobile learning activities such as the Explore! program (Costabile *et al*., 2008), Mobile Quiz, Tatoes (Vogel, Kennedy, & Kwok, 2009) and language learning applications (Che *et al*., 2009; Pirasteh & Mirzaeien, 2015; Wang *et al*., 2009).

The language activity given to students in Che *et al*. (2009) study has proven to increase the interest of the students to use mobile devices in accomplishing their task despite the fact that the device was not so supportive and helpful. Furthermore, a study by Pritchett, Wohleb and Pritchett (2013) concluded that educators agreed virtual learning networks, video sharing and online event scheduling were important educational web applications which should be used in mobile learning and teaching practices. However, Vogel, Kennedy and Kwok (2009) found that the use of mobile applications developed for their study decreases towards the end of the research. They concluded that educators and administrators have not yet given their full commitment towards mobile learning which might give an impact to its usage. This finding has made it necessary to further investigate educators' role in the implementation of mobile learning.

2.7.4 Language Learning and Technology

Language teaching and learning is not confined to the usage of specialized technology classrooms as in language laboratories equipped with computer and internet facilities. With the advancement of mobile technology, it has the advantage of making language learning environment more flexible, informal, personalized and spontaneous. The introduction of mobile technology has changed the language learning environment as it can be used as a teaching tool. However, some language educators are still having misconceptions and myths on the usage of modern technology as indicated by Blake (as cited in Shih, 2007).

The first myth is that all technology is the same. Nevertheless, there are many different types of devices that can be used in teaching language such as the Web, CD-ROMs, computer-mediated communication (CMC), electronic bulletin boards, messaging systems and chat programs. A good language educator should be able to distinguish which technology device best suits the instruction of the curriculum and the needs of the students. The second myth is that using technology is a type of methodology. Some educators believe that the usage of technology in teaching language is to release the burden of the educators from doing routine classroom activities. By using mobile technology in teaching and learning routines, the educators have the choice in allowing the students to have more freedom in practicing and using the language outside the classroom hours. Another myth is that technology is constant and can be used in a certain extended period of time. This misconception is due to the resistance in changing the present practice as the changes intimidate these educators to transform their teaching methods along with the fear of using the technology. Nowadays, new language tools that incorporate recent technology have been invented to cater the needs of the students who constantly experience improvements and enhancements in their access to education. Thus, educators need to embrace the new technologies being introduced so that they are capable to pursue and integrate these technologies into their teaching procedures. The last myth is the fear that the usage of technology will replace language instructors. In contrast, it is found that educators lacking in technology abilities are being replaced by people who are able to use them. Consequently, language educators need to take advantage of technology as it has been proven that students get enhanced benefits when they are engaged in technology enabled language courses. To achieve this, language educators should resist the persuasion into believing the misconceptions and myths about technology and begin to accept the new courses of transformation by seizing the opportunities to use these technologies (Blake, as cited in Shih, 2007).

Several initiatives were taken to promote language learning through mobile devices which included the Learning on the Move (LOTM) program designed by Thornton and Houser (2005). English vocabulary materials were sent using SMS to Japanese students and it was found that this method has promoted regular study on language learning. Other studies have also been conducted to evaluate the mobile phone as a portable tool to teach and learn vocabulary (e.g. Brown, 2008; Chen, 2014; Huang *et al*., 2016; Kimura & Shimoyama, 2009) and they found that learning vocabulary through mobile phones increases the students' motivation and matches their language learning style. In addition, Mariam and Woollard (2012a) proposed an implementation strategy to learn the English language vocabulary using mobile phones in Malaysia. Their study also found that mobile phone is a viable tool to teach and learn English as it is an affordable and a common device owned by students (Mariam & Woollard, 2012b).

Besides vocabulary learning, other studies have demonstrated that mobile technology devices could be used to teach other skills such as reading, listening, syntax and phrasal verbs. Chen and Hsu (2008) presented a Personalized Intelligent Mobile Learning System (PIMS) which suggests English news articles for students to read while Lin (2014) proposed an online Extensive Reading Program (ERP) that uses mobile tablets for learners to enhance their reading abilities. In addition, studies have also presented activities for English language listening and vocabulary acquisition using PDAs (Hsu *et al*., 2013) and podcast (Md Masudul & Tan, 2012). Subsequently, the learners would discover new vocabularies as they listen and read materials using these mobile devices. On top of that, studies found that students portrayed positive attitudes towards language learning when they were exposed to phrasal verbs (Pirasteh & Mirzaeian, 2015) and English syntax (Arani, 2016) sent through SMS. The usage of SMS from these studies showed that students perceive the system as a beneficial tool to learn English. However, the usage of PDA and podcast limits the sample of respondents as most students do not own such devices. Besides, the price market for a PDA is much higher compared to a mobile phone and the battery poses serious limitations as its average usage is only up to four hours.

The Test of English for International Communication (TOEIC) project was also conducted by Kimura (2009) to determine the effectiveness of the program through mobile learning as compared to computer learning. Students show high expectations towards mobile learning and the test scores prove that mobile learning is equal to computer learning. The project also tested listening comprehension materials with video clips through mobile phones and students provided positive feedbacks on the learning materials.

These language learning projects have shown that mobile phones can be an effective tool in delivering language learning materials to students. The current movement towards mobile learning has made it necessary for educators to adapt their roles as transmitters of knowledge to guiders of learning resources. This gives a large impact to the language educators as they need to equip themselves with the appropriate skills and knowledge especially in developing specific and suitable language materials using the mobile technology. However, little guidance has been provided for these educators to achieve the best results in mobile learning.

2.8 Studies on Technology Acceptance Model (TAM)

Studies on individual acceptance towards new technologies offer significant contribution and worth conducted as these technologies are developed to assist individuals in achieving better communication and valuable information. Prior studies have worked on the extension of TAM model to fit different contexts of technology acceptance. Studies that used TAM to explore various aspects of technology adoption included computer technology (e.g. Davis, Bagozzi, & Warshaw, 1989; Holden & Rada, 2011; Joseph, 2015; Shih, 2007; Teo & Zhou, 2014; Wong *et al*., 2013; Wong & Teo, 2008), e-learning (e.g. Chen & Tseng, 2012; Gao, 2005; Lateef & Alaba, 2013; Liu, Liao, & Peng, 2005; Mbarek & Zaddem, 2013; Ong & Lai, 2006; Park, 2005; Park, 2009; Punnoose, 2012; Ramirez-Correa, Arenas-Gaitan, & Rondan-Cataluna, 2015; Saadé & Kira, 2006; Saadé, Nebebe, & Tan, 2007; Sujeet Kumar & Jyoti Kumar, 2013; Tarhini, Hone, & Liu, 2013; Zanjan & Ramazani, 2013) and mobile technologies (e.g. Chin & Vimala, 2017; Farzana & Ainin, 2008; Gribbins, 2007; Kim & Garrison, 2009; Lu, Liu, Yu, & Yao, 2003; Nysveen, Pedersen, & Thorbjornsen, 2005; Ramayah & Norazah, 2006; Rudito, 2010; Songpol, Bruner II, & Neelankavil, 2014; Ursavas, 2015).

The investigation of technology acceptance on e-learning has received the attention of many researchers due to the widespread of computer technology and Internet facilities. These research applied TAM to investigate user's intention to use e-learning (e.g. Chen & Tseng, 2012; Gao, 2005; Lateef & Alaba, 2013; Liu, Liao, & Peng, 2005; Mbarek & Zaddem, 2013; Ong & Lai, 2006; Park, 2005; Park, 2009;

Punnoose, 2012; Ramirez-Correa, Arenas-Gaitan, & Rondan-Cataluna, 2015; Saadé & Kira, 2006; Saadé, Nebebe, & Tan, 2007; Sujeet Kumar & Jyoti Kumar, 2013; Tarhini, Hone, & Liu, 2013; Zanjan & Ramazani, 2013) and they found that the relationships between PE─PU, PU─ATT, ATT─BI are significant. A mixed result was found for PE─ATT relationship as some studies found it insignificant (Gao, 2005; Saadé, Nebebe, & Tan, 2007; Zanjan & Ramazani, 2013) while other researchers discovered that it had a positive relationship (Chen & Tseng, 2012; Liu, Liao, & Peng, 2005; Mbarek & Zaddem, 2013; Park, 2009; Saadé & Kira, 2006). In addition, the result for PU─BI relationship contradicts as studies found it significant (Chen & Tseng, 2012; Gao, 2005; Lateef & Alaba, 2013; Liu, Liao, & Peng, 2005; Park, 2005; Punnoose, 2012; Ramirez-Correa, Arenas-Gaitan, & Rondan-Cataluna, 2015; Sujeet Kumar & Jyoti Kumar, 2013) while other analyses did not support the relationship (Park, 2009; Saadé, Nebebe, & Tan, 2007).

Other research on e-learning has extended the TAM by including external variables to PE and PU which included self-efficacy, computer experience, anxiety, subjective norm and system accessibility. These studies found that self-efficacy (Chen & Tseng, 2012; Ong & Lai, 2006; Park 2009) and computer experience (Mbarek & Zaddem, 2013; Park, 2005; Punnoose, 2012; Sujeet Kumar & Jyoti Kumar, 2013) had significant relationships to PE. In addition, computer self-efficacy produced mix results as it had a positive relationship with behavioural intention (Sujeet Kumar & Jyoti Kumar, 2013) and PU (Chen & Tseng, 2012) but no influence on e-learning behaviour (Mbarek & Zaddem, 2013). Interestingly, anxiety (Chen & Tseng, 2012;

Saadé & Kira, 2006) and system accessibility (Park, 2009) had positive relationships with PE but not towards PU in determining the attitude of users towards online learning system. In contrast, subjective norm (Park, 2009; Punnoose, 2012; Tarhini, Hone, & Liu, 2013) had supported relationships with PU and BI. These studies have shown that the influence of external variables towards PE and PE in the acceptance of e-learning technology produced results which can be further investigated especially in the adoption of other technologies as in mobile technology.

According to Brown (2005), e-learning and m-learning are very closely linked since m-learning is defined as the process of e-learning through the use of mobile devices. In order to investigate user's acceptance towards m-learning, it is important to review TAM literature on mobile technologies besides those related to e-learning. TAM studies in mobile technologies cover the features of mobile services (e.g. Kim & Garrison, 2009; Lu *et al*., 2003; Nysveen, Pedersen, & Thorbjornsen, 2005; Rudito, 2010) and mobile devices (e.g. Farzana & Ainin, 2008; Gribbins, 2007; Ramayah & Norazah, 2006; Songpol, Bruner II, & Neelankavil, 2014; Ursavas, 2015). The relationships between TAM major variables were investigated and results showed that PE─PU, PU─BI or PU─ATT, PE─BI or PE─ATT have significant relationships (Farzana & Ainin, 2008; Gribbins, 2007; Ramayah & Norazah, 2006) except Ursavas (2015) who found insignificant relationship for PE─BI. Among these studies, subjective norms, self-efficacy, job relevance and facilitating conditions were included as variables that affect the intention to use the technology investigated. The results found that subjective norms supported BI (Lu *et al*., 2003; Nysveen, Pedersen, & Thorbjornsen, 2005), self-efficacy was mediated by PE and PU towards ATT (Songpol, Bruner II, & Neelankavil, 2014), facilitating conditions did not directly affect BI (Lu *et al*., 2003) and job relevance moderated the relationship between PU and BI (Kim & Garrison, 2009). This shows that subjective norms and job relevance present significant roles in the user's decision to accept or adopt a new technology.

2.8.1 TAM Studies on Mobile Learning

Mobile learning is a recent development in the education world especially in the Malaysian context. Due to this, this research focuses on the investigation of mobile learning usage behaviour by academics at higher learning institutions because they can be considered as important human resources in the education world (Han, 2003). TAM was also used to investigate user behaviour on the acceptance of mobile learning (e.g. Akour, 2009; Huang, Lin, & Chuang, 2007; Joo, Lee, & Ham, 2014; Ju, Wathanaporn, & Do, 2008; Lu & Viehland, 2008; Mac Callum, Jeffrey, & Kinshuk, 2014; Park, 2006; Seyal, Mohd Noah, Rudy, & Armanadurni, 2015; Tan, Ooi, Sim, & Kongkiti, 2012; Theng, 2009) but these studies had largely focused on students' use rather than educators' use, even though the educators also play a critical role in the dispersion of mobile learning systems. It is essential to investigate the educator's perception of mobile learning because the knowledge on the factors that influence mobile learning can help to promote their willingness to adopt and use such technology.

Findings from studies on mobile learning showed some interesting results. Firstly, the studies utilized different constructs as the indicator for user acceptance. Some studies used BI (Joo, Lee, & Ham, 2014; Mac Callum, Jeffrey, & Kinshuk, 2014; Park, 2006; Seyal *et al*., 2015; Tan *et al*., 2012; Theng, 2009) while others used ATT to mediate the actual usage construct (Akour, 2009; Huang, Lin, & Chuang, 2007; Ju, Wathanaporn, & Do, 2008; Lu & Viehland, 2008). The reason why some researchers excluded the ATT variable in their studies was because Davis, Bagozzi and Warshaw (1989) concluded that PU─BI relationship was more significant. The explanation for this is that when users perceive a technology to be more useful, they may have a higher level of BI to use the technology even though they have a negative attitude towards it. In addition, researchers found that the role of ATT in explaining BI was very limited which leads to the conclusion that ATT was a partial mediator in the relationship between prominent variables and the adoption behavior (Venkatesh & Davis, 2000; Venkatesh *et al*., 2003). On top of that, Yousafzai, Foxall and Pallister (2007) concluded that the relationship between ATT and BI was insignificant for non-student sample while Kim, Chun and Song (2009) found that ATT produced partial or no mediation results for studies comprising of new technology and inexperienced users.

Secondly, the constructs of PU and PE revealed different types of relationship with other variables in TAM. The studies found that PU had a positive relationship with BI/ATT but the construct PE exhibited inconsistent relationship with BI/ATT. Some studies found PE significant (Akour, 2009; Huang, Lin, & Chuang, 2007; Joo, Lee,

& Ham, 2014; Lu & Viehland, 2008; Tan *et al*., 2012; Theng, 2009) while other studies discovered that it was insignificant (Ju, Wathanaporn, & Do, 2008; Mac Callum, Jeffrey, & Kinshuk, 2014; Park, 2006; Seyal *et al*., 2015). This confirms the review on TAM studies conducted by Lee, Kozar and Larsen (2003) who found that more than 20 percent of the studies found insignificant relationship between PE and BI as compared to 11 percent for PU and BI relationship. The result also suggested that PE was not as constant as PU in measuring BI/ATT. This leads to the conclusion that PU was a stronger determinant to BI/ATT than PE. Moreover, these studies on mobile learning exhibited a significant effect between PE and PU (Akour, 2009; Huang, Lin, & Chuang, 2007; Joo, Lee, & Ham, 2014; Ju, Wathanaporn, & Do, 2008; Lu & Viehland, 2008; Mac Callum, Jeffrey, & Kinshuk, 2014; Seyal *et al*., 2015; Tan *et al*., 2012; Theng, 2009).

Another distinct feature from these studies is that they incorporated other variables besides PE and PU in examining the prediction variables on the acceptance of mobile learning. The variable self-efficacy received the most attention in these studies on mobile learning and the findings showed that self-efficacy was positively associated with PE (Ju, Wathanaporn, & Do, 2008; Lu & Viehland, 2008; Theng, 2009) and PU (Lu & Viehland, 2008). Self-efficacy is defined as "the belief that one has the capability to perform a particular behaviour" (Lee, Kozar, & Larsen, 2003, p.761). This means that a person with positive self-efficacy will be more encouraged to acquire skills or new usage of technology as compared to a person with negative self-efficacy. In mobile learning studies, self-efficacy was found to have a positive association towards BI (Park, 2006) but it had no significant influence on ATT (Ju, Wathanaporn, & Do, 2008). Due to this, attention should be given to further investigate the variable self-efficacy in related to TAM framework and mobile learning environment.

In addition, the existing mobile learning studies showed that subjective norm or social influence was the least studied construct which contradicted the view from Venkatesh *et al*. (2003) that subjective norm was a core construct in TAM. Besides, Venkatesh and Davis (2000) empirically confirmed that subjective norm was the most influential determinant of PU, particularly when the users have little experience or newly exposed to such technology. Subjective norm is described as “a person’s perception that most people who are important to him think he should or should not perform the behaviour in question” (Fishbein & Ajzen, 1975, p.302). Studies have shown that subjective norm performed two antecedent roles of BI and PU/PE and its influence was subjected to a wide range of contingent influences (Venkatesh *et al*., 2003). The studies on mobile learning found that subjective norm was positively related to PE and PU (Akour, 2009; Lu & Viehland, 2008) while others found that it had positive association with BI (Park, 2006; Tan *et al*., 2012).

Besides self-efficacy and subjective norm variables, the variable experience was also found used in TAM studies on mobile learning. The studies measured different aspects of prior experience which included mobile (Mac Callum, Jeffrey, & Kinshuk, 2014; Tan *et al*., 2012; Theng, 2009), computer (Park, 2006) and e-learning (Lu &

Viehland, 2008). In order to measure prior mobile experience, Theng (2009) used the items which are related to the skills in mobile technology as in sending emails and SMS messages, downloading multimedia files and accessing the Internet through mobile devices. It is interesting to find that prior mobile experience produced mixed results with PE since Theng (2009) concluded that it was significant whereas other studies found an insignificant relationship (Mac Callum, Jeffrey, & Kinshuk, 2014; Tan *et al*., 2012). The same inconclusive result was also found between prior mobile experience and PU as Tan *et al*. (2012) discovered it was positive but Mac Callum, Jeffrey and Kinshuk (2014) concluded it had a negative relationship. Thus, other studies should further investigate the variable on prior mobile experience in order to strengthen its relationship with the constructs of TAM especially in the context of mobile learning.

2.8.2 TAM Studies on Mobile Phones

Besides reviewing literature on mobile learning studies, it is also important to investigate research that focuses on mobile phone adoption as this research intends to investigate the English language academics' intention to use mobile phones in mobile learning context. TAM has also been used by researchers to investigate the factors that influence user's mobile phone adoption (e.g. Chin & Vimala, 2017; Conci, Pianesi, & Zancanaro, 2009; Kwon & Chidambaram, 2000; Teo & Pok, 2003; van Biljon & Kotze, 2008). The factors commonly found in studies related to mobile phones are PE, PU, BI, social influence, facilitating conditions and enjoyment. It can be noted that the variable ATT was also excluded in the research models.

Studies examining the influence of core constructs of TAM on the usage of mobile phones found that the relationship between PE and PU was significant (Conci, Pianesi, & Zancanaro, 2009; Kwon & Chidambaram, 2000) while the variable PE was significantly related to BI in using mobile phones (Conci, Pianesi, & Zancanaro, 2009; van Biljon & Kotze, 2008). In addition, the same studies also concluded that the relationship between PU and BI was significant. It can be noted that studies utilizing TAM on mobile phones are still small in number which further emphasizes the need to make further investigation on these variables.

The variable social influence which also refers to subjective norm is another factor integrated in studies related to usage of mobile phones. Positive associations were found between subjective norm and PU (Conci, Pianesi, & Zancanaro, 2009; van Biljon & Kotze, 2008), and subjective norm with BI (Conci, Pianesi, & Zancanaro, 2009; Teo & Pok, 2003) which proved that users behaviour towards using new technology such as the mobile phone is positively related to the influence of people who are important to them. It is also found that subjective norm had a bigger effect if the person is at the initial stage of adopting a new technology (Teo & Pok, 2003).

Other common variables that were also included in mobile phone adoption models are facilitating conditions and enjoyment. Researchers found that facilitating condition had positive influence on PU (van Biljon & Kotze, 2008) and BI (Conci, Pianesi, & Zancanaro, 2009; van Biljon & Kotze, 2008) which means the need for support is crucial at the initial stage of technology adoption. Nevertheless, these researchers disagreed with the relationship of facilitating conditions and PE as van Biljon and Kotze (2008) found it significant while Conci, Pianesi and Zancanaro (2009) concluded that it had a negative association. The variable enjoyment had significant relationships with PU and PE but insignificant correlation with BI (Conci, Pianesi, & Zancanaro, 2009). Meanwhile, Kwon and Chidambaram (2000) investigated the influence of PE towards enjoyment and found it had a positive significance on the users' adoption of mobile phone. This implies that mobile phone users perceive the easy to use feature would lead to an increased enjoyment when using such technology.

The variables anxiety and self-efficacy were also examined in studies related to mobile phone usages. Anxiety was termed as apprehensiveness (Kwon & Chidambaram, 2000) and they found it had negative correlations with enjoyment and PU. The research concluded that motivations to use mobile phones were strongly influenced by their perceptions on the ease of use rather than the apprehensiveness they have when using them. The variable self-efficacy was included in a study done by Teo and Pok (2003) which adapted the decomposed theory of planned behavior and the findings suggested positive association between self-efficacy with perceived behavioural control. The factor perceived behavioural control was described as "the beliefs about having the necessary resources and opportunities to adopt" the technology (Teo & Pok, 2003, p.489). However, perceived behavioural control has little effect on the users' intention to adopt WAP-enabled mobile phone. They concluded that since perceived behavioural control was significantly influenced by self-efficacy, the rejection of perceived behavioural control on BI displayed that these users perceive the adoption of WAP-enabled mobile phone as unimportant as they are in control of using the technology.

From the review on these variables, it is observed that the variables subjective norm and self-efficacy exhibit important roles when investigating user's intention to adopt mobile phones. Due to that, this study includes these variables in its proposed research model with the notion to further validate the influences of these variables towards the intention to use mobile phones. However, the variables facilitating conditions (support), enjoyment and anxiety (apprehensiveness) are being excluded because the nature of this study does not examine the educators' actual usage of using mobile technology but only investigates their intention to use such technology.

The reviewed research related to TAM on mobile learning and mobile phones is mainly focused on students or mobile phone/internet users as its research sample. To this date no such research has been done to investigate educators' perception in the usage of mobile technology in mobile learning environment. Thus, using TAM constructs with the selected external variables of subjective norms, self-efficacy and prior mobile technology experience, it is hoped that this research will further verify the factors that contribute towards the acceptance of mobile technology.

2.8.3 Limitations in TAM Studies

It is crucial to understand the factors that influence the users' acceptance and adoption of a technology. Davis (1989) developed TAM to represent how users accept and use a technology. The model suggested several factors that influence the decision of users to use a new technology which are PU, PE, and ATT towards using a technology and BI which then predict the actual usage of a system.

From the original TAM, other researchers have extended or modified the model to further explain the factors that influence individuals to use certain type of technology. However, the use of these models may have some limitations. Firstly, the explanatory power of these models may not reach its expectation of more than 60 percent (Sun & Zhang, 2006). Studies conducted should take into account the means to increase its explanatory power either by incorporating more variables into the model, examining different types of technology systems, varying the measurement of actual technology usage and employing samples other than students (Lee, Kozar, & Larsen, 2003).

Another limitation of the models is the contradictory results among the relationships of the constructs used in TAM. According to reviewers (King & He, 2006; Lee, Kozar, & Larsen, 2003), researchers were unable to make generalizations of the models across different types of technology based on the original variables of TAM and student sample. Consequently, Sun and Zhang (2006) suggested that the inclusion of moderator variables into the model could further improve the explanatory power of the model and refine the inconsistency findings of the studies. This was also suggested by other reviewers (Han, 2003; Marangunic & Granic, 2015) who proposed the incorporation of moderator variables like individual differences (i.e. gender), organisational factors and cultural aspects in the model besides using different target groups (King & He, 2006) and system usage.

2.9 Moderator Variables

Moderator is defined as a third variable (Z) that changes the relation between a predictor (X) and an outcome (Y) which then affect the strength and direction of the relation between two variables (Fairchild & McQuillin, 2010) as shown in Figure 2.15. As such, the term moderation is the effect of the moderator has on the association between two or more variables (Dawson, 2013).

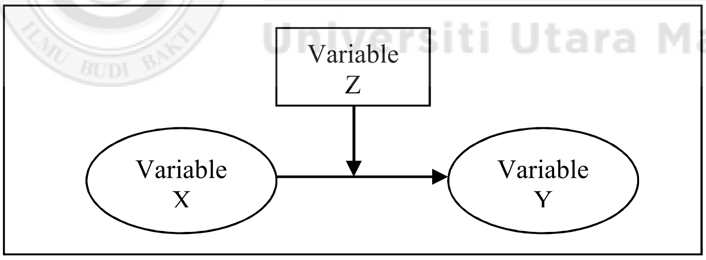


Figure 2.15. Conceptual path diagram of moderation

The addition of moderator variables in TAM has received the attention of several researchers due to the evaluation made by Venkatesh *et al*. (2003) that moderators significantly improve the predictive validity of the models tested. Moreover, studies (King & He, 2006; Sun & Zhang, 2006) have proposed researchers to consider the inclusion of moderator factors in their models because these moderators are found to influence most of the relationships found in TAM. As such, their study presented ten moderator factors which were then categorized into three main groups of organizational factors (voluntariness, and task/profession), technological factors (individual/group, purpose and complexity), and individual factors (intellectual capability, cultural background, gender, age and experience). For this research, the unit of analysis is the English language lecturers from UiTM which represents the individual level of sample resources. Due to this, the model in this study focuses only on the moderator variables of individual factors.

2.9.1 Individual factors

The first individual factor is intellectual capability which is also related to the individual's profession. It is assumed that people with higher level of intellectuality would have different perceptions on the specific technology (Sun & Zhang, 2006). However, this moderator is be included in the research model because majority of the English language lecturers in UiTM are Masters graduate while some are in the process of pursuing their post-graduate studies. Due to the reason that these lecturers possess an equal level of intellectual and mental capacity, this moderator variable is not expected to influence the acceptance of mobile learning among UiTM English language lecturers.

The moderator experience is also excluded in the model because it refers to the statement that when a person is more familiar with a system, then they are more knowledgeable with it (Sun & Zhang, 2006). In UiTM, mobile learning is not formally implemented or included as one of the teaching and learning methods like lecture or tutorial modes. Besides, mobile learning is still considered a new type of education technology and UiTM is making its way to establish and enforce the e-learning culture into its teaching and learning processes through the usage of Learning Management System (LMS) called i-Learn (Norsaniah *et al*., 2012). The other moderator variables for individual factors are gender, age and cultural background. The next section elaborates those moderators and its research implications.

2.9.2 Gender

The moderator gender has also been included in research adopting the TAM. Gender has been found to have different effects on the decision to technology usage (Han, 2003). A study on teachers' readiness to use mobile phone in teaching showed that male teachers are more keened towards mobile learning (Issham *et al*., 2013) whereas Lateef and Alaba (2013) concluded that female teachers showed a higher level of habitual use of online learning than the male teachers. This is because men are considered more practical and task-oriented which relates to PU variable (Sun & Zhang, 2006). In contrast, PE is associated with women as they have higher anxiety and lower self-efficacy levels as compared to men. In addition, women react more positively towards subjective norms because they are more responsive and can be easily influenced by other people's emotions (Venkatesh & Morris, 2000). In other words, PU influences men, while PE and subjective norms affect women's decision to use a technology.

From the findings of Venkatesh and Morris (2000) and Gefen and Straub (1997), they concluded that gender moderated the relationship between major TAM variables but both genders show different significance level for PU─BI and PE─BI relationships. Besides, the inclusion of gender has significantly increased the explanatory power of TAM to 52 percent (Venkatesh & Morris, 2000). Other TAM studies have also investigated the effects of gender towards technology usage. A study by Ong and Lai (2006) investigated the acceptance of e-learning technology among employees and they concluded that men showed a higher degree of perceptions in relation to PU, PE and BI as compared to women. Moreover, PU was found to be a more prominent factor to men in determining BI to use e-learning.

In contrast, most research used UTAUT to examine the moderation effects of gender such as Aguirre-Urreta and Marakas (2010) who found that male respondents reacted more positively than females towards PU while females had a stronger effect towards PE in the usage of computer software. Other research that used UTAUT to examine the gender effect included the studies on mobile applications and services (Guo, 2015; Im, Kim, & Han, 2008; Moryson & Moeser, 2016), mobile technology devices (Arning & Ziefle, 2007; Manimekalai, 2013) and mobile learning (Jackman, 2014; Wang, Wu, & Wang, 2009). Since not many studies of TAM were found to investigate the moderator variable, this study incorporates the moderator variable of gender in order to examine its effect towards the intention to use mobile technology among language academics.

2.9.3 Age

Only several prior studies of TAM are known to incorporate the moderator variable age. The studies that featured age in their models found that this moderator variable influences the decisions to use of technology. For example, Conci, Pianesi and Zancanaro (2009) investigated the acceptance of mobile phones by elderly people focusing on the motivational structure of enjoyment and self-actualization. Even though comparison with the younger people could not be made in this study, the researchers concluded that older people behaved like novice users of technology. This is due to the highly significant relationship between PE and BI which means that the older people would consider the mobile phone ease of use before deciding to use the technology. Another study on mobile phone was also conducted by Kwon and Chidambaram (2000) which included the respondents' individual characteristics of age. The findings showed that age had a strong and significant association with subjective norms which means that older people experienced more pressure when using mobile phones as compared to younger respondents.

The review revealed that most studies on technology usage incorporates UTAUT model in the investigation of moderator variable such as in the analysis of e-learning (Khechine *et al*., 2014; Tarhini, Hone, & Liu, 2014), internet (Napaporn, 2007), mobile technology devices (Arning & Ziefle, 2007; Manimekalai, 2013) and mobile learning (Jackman, 2014; Wang, Wu, & Wang, 2009). Some studies significantly confirmed that age had a moderation effect between PU and BI (Arning & Ziefle, 2007; Jackman, 2014; Khechine *et al*., 2014; Napaporn, 2007) while others discovered age moderated PE and BI (Arning & Ziefle, 2007; Napaporn, 2007; Tarhini, Hone, & Liu, 2014; Wang, Wu, & Wang, 2009). Due to the lack of TAM studies that focus on technology usage like e-learning, mobile learning and mobile technology devices which incorporate age as its moderator variable, this study proposes to include age in its research model.

2.9.4 University Culture

All behaviours have their own distinctive ways of doing things which can be regarded as the uniqueness of the organizations. These obvious or apparent systems of doing things in an organization would then lead into culture which describes the patterns of behaviour, values, assumptions, beliefs or ideologies that members have about their organization (Kezar & Eckel, 2002). Organisational culture is gained when employees joined a workplace and it has a significant role when an individual adopts new technologies (Cooper, 1994).

Zakour (2004) advocated that culture can affect a person's habit which means that research on usage behaviour as in TAM should integrate cultural factors into its model. It can be said that people may behave and perform differently due to the unique varieties of culture found across the nations and this suggests that cultural factors can have an impact on usage behaviour. For this research, cultural background would focus on the workplace environment that these educators deal or experience.

2.9.4.1 Teaching University

In higher learning institutions, culture incorporates the values and beliefs based on tradition which portrays the personality of the institution (Fralinger & Olson, 2007). Most of the research focusing on technology acceptance was conducted in Western countries but the findings from these research could not basically be used to represent other countries especially the Eastern part of the world as in Asia.

Being the largest university in Malaysia, UiTM aims to reach a total number of 200,000 enrolments by the year 2020. On top of that, with the recognition of its establishment, UiTM has also been awarded as the first higher learning institution to receive full certification in the aspects of teaching and learning (Ahmad Redzuan & Soraya, 2010). As a highly reputable teaching university in Malaysia, UiTM needs to establish high standards of academic achievement for every academic staff to achieve in order to prepare them for the challenges of the global society and information age (Kamaruzaman & Siti Akmar, 2009). As noted by Hunt (2003), the principle of being a good teaching university is designing the curriculum in accordance with the learner's needs which include creating interactive online learning opportunities through the integration of innovation and new technologies.

The use of technology has been proven to enhance teaching and learning even though some educators may dawdle or refuse to take the opportunities to employ new technologies. According to Bright and Yang (2004), Asian countries are still fostering teacher-centered style of teaching and learning while the Western world have been found to adopt learner-centered processes through the use of electronic interactive learning systems. In addition, many academics believe that face-to-face mode of teaching is naturally better than technology mediated teaching. Although some academics demonstrated positive attitudes towards technology integrated teaching, they still faced barriers in using technology in their teaching.

A study by Napaporn (2007) proposed the internet acceptance model which incorporated the TAM variables and also included the cultural aspect of higher learning institution as one of its moderator. The study conducted on Thailand academics integrated the characteristic of being a research university as a moderator that significantly impacted the usage behaviour of using internet. Even though being a research university did not significantly moderate the influence of PU, PE, social influence, facilitating conditions and self-efficacy predictors, it significantly moderated the relationship between usage behaviour and BI. This means that the culture of being a research university can affect the academics' behaviour to use the internet technology. Besides that, Windschitl and Sahl (2002) concluded that the school culture which surrounds the adoption of technology and the teacher's perception of school culture has an impact on the decision to use technology.

2.9.4.2 Lecturer's Workload

Being an academic staff requires an individual to perform and fulfill several types of services or what is termed as lecturer's workload. Workload is defined as all activities related to professional duties, responsibilities and interests that take the time of the university lecturer (Ruhil Hayati, Jamaliah, Mohd Hassan, Hamidah, Rusli, & Mohd Ghazali, 2006). Basically, the workload of a university lecturer includes the categories of teaching, research and services. In UiTM, the academic staff must demonstrate excellence and achievement in these three areas in order to be promoted.

Teaching workload covers teaching-related activities as in material preparation, actual in-class time working with students and time spent during learners' mentoring or consultation sessions. In addition, teaching activities are influenced by various factors such as the number of students being taught, the level of courses, credit and contact hours, campus course design whether it is an off or on campus course (Kamaruzaman & Siti Akmar, 2009) and teaching approaches which include face-to-face, e-learning and blended learning. Having a large number of students in UiTM, the main role of the lecturers is to fulfill the teaching hours of 16 to 18 hours a week. Most of the teaching and learning procedures take place in lecture and tutorial forms which require face-to-face meetings with the students either in lecture halls or classrooms. On top of that, faculties have been instructed to integrate e-learning applications into the curriculum which leads to the implementation of blended learning (face-to-face and online learning).

In addition to the teaching responsibility, academic staff should accomplish the track of attaining academic excellence by conducting research. Research workload includes the tasks of applying and obtaining external funding, conducting and managing research project, developing and generating research outputs, producing publications of professional reports and presenting conference papers (Ruhil Hayati *et al*., 2006). Even though educators in UiTM are encouraged to conduct research, their main core of duty is to teach and facilitate the learners.

Service activities cover services within and outside the university which can be grouped under the categories of institutional service and professional service. Institutional services cover administration and committee work for the purpose of ensuring better quality teaching and research activities. Lecturers perform administrative duties to the university by being the faculty dean, head of department and program coordinator in which they carry out the task of managing academic matters and ensuring that the university functions better. Meanwhile, committee work includes being a member of specific committee like curriculum development, or college activities as to help administrators in producing quality and intellectual community. The second category of service workload is professional service which is done to support academic disciplines. These lecturers are usually distinguished academics in their scholarly field and through their expertise; they serve for professional organizations, manage academic convention, become editors for publications or contribute services towards their own academic professional development (Ruhil Hayati *et al*., 2006). In addition, UiTM lecturers are expected to include consultancy activities and community service activities (Kamaruzaman & Siti Akmar, 2009).

With the acknowledgement that UiTM academics have the responsibility to fulfill the workloads of teaching, researching and servicing, this research integrates the moderator variable of university culture to represent the cultural background of the organization into the proposed research model.

2.10 Theoretical Framework

Theoretical framework is a process of structuring a network of theories that directly or indirectly has a bearing on the research being done (Ranjit, 2011). The literature review concentrated on five prominent user acceptance models (TRA, TPB, DIT, UTAUT & TAM) which supported the development of the theoretical framework of this study. These models were evaluated based on their degree of parsimony and degree of explanation about the behavior (Taylor & Todd, 1995). As such, this research aims to evaluate the variables that contribute to the prediction of an understanding towards the phenomenon as well as offer its practical application.

When measuring people's behaviour towards technology acceptance, the key dependent variable would either be BI or actual usage behaviour. Previous studies either measured behaviour towards technology acceptance through cross-sectional or longitudinal surveys. Cross-sectional survey collects data over a sample of population at a single point in time whereas longitudinal survey gathers information at different extended points in time to study changes in behavior (Ary, Jacobs, Razavieh, & Sorensen, 2006). Most of these studies modified the theories of user acceptance in order to produce their own theoretical framework.

From the summary of research on user acceptance models as in Table 2.5, most research adopted cross-sectional studies since the technology being investigated had never been introduced before or had just been introduced recently. As such, BI is used as a measurement since the individuals either had no experience in using the technology or they are in the early stage of adopting the technology. Consequently, since the usage of mobile devices in teaching practices has not been fully implemented and experienced by the English language academics of UiTM, the study then utilizes BI as its dependent variable. In addition, measurement of BI helps to identify future usage of mobile devices in teaching practices and influence the intention of academics to use the technology in the future.

Table 2.5

Research on user acceptance models

Study	Model used	Dependent variable	Type of survey	Target technology
Chin & Vimala (2017)	TAM	Behavioural intention	Cross-sectional	Mobile technology
Moryson & Moeser (2016)	UTAUT	Behavioural intention	Cross-sectional	Mobile service
Guo (2015)	UTAUT	Behavioural intention	Cross-sectional	Mobile service
Seyal *et al*. (2015)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Jackman (2014)	UTAUT	Behavioural intention	Cross-sectional	Mobile learning
Tarhini, Hone, & Liu (2014)	UTAUT	Behavioural intention	Cross-sectional	E-learning
Ursavas (2015)	TAM	Behavioural intention	Cross-sectional	Tablet PC
Cheng (2014)	TAM + DIT	Behavioural intention	Cross-sectional	Mobile learning
Joo, Lee, & Ham (2014)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Mac Callum, Jeffrey, & Kinshuk (2014)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Chen, Lin, Yeh, & Lou (2013)	TRA + TAM	Behavioural intention	Cross-sectional	E-learning
Manimekalai (2013)	UTAUT	Behavioural intention	Cross-sectional	Mobile phone
Nistor, Gogus, & Lerche (2013)	UTAUT	Usage behaviour	Cross-sectional	Computer
Sujeet Kumar & Jyoti Kumar (2013)	TAM	Behavioural intention	Cross-sectional	E-learning
Tarhini, Hone, & Liu (2014)	UTAUT	Behavioural intention	Cross-sectional	E-learning
Wong *et al*. (2013)	TAM	Behavioural intention	Cross-sectional	Computer
Chen & Tseng (2012)	TAM	Behavioural intention	Cross-sectional	E-learning
Nasri & Charfeddine (2012)	TAM + TRA	Behavioural intention	Cross-sectional	Facebook
Tan *et al*. (2012)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Lee, Hsieh & Hsu (2011)	DIT + TAM	Behavioural intention	Cross-sectional	E-learning

Tolentino (2011)	TAM	Usage behaviour	Cross-sectional	Web portals
Tselios, Daskalakis, & Papadopoulou (2011)	TAM	Behavioural intention	Longitudinal	Blended learning
Ktoridou & Eteokleous (2010)	UTAUT	Usage behaviour	Cross-sectional	Wireless technology
Lee, Cerreto, & Lee (2010)	TPB	Behavioural intention	Cross-sectional	Computer
Wang & Wang (2010)	UTAUT	Behavioural intention	Cross-sectional	Mobile internet
Akour (2009)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Conci, Pianesi,& Zancanaro (2009)	TAM	Usage behaviour	Cross-sectional	Mobile phone
Kim & Garrison (2009)	TAM	Behavioural intention	Cross-sectional	Wireless technology
Ramayah *et al*. (2009)	TPB	Behavioural intention	Cross-sectional	Internet
Theng (2009)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Wang, Wu, & Wang (2009)	UTAUT	Behavioural intention	Cross-sectional	Mobile learning
Farzana & Ainin (2008)	TAM	Behavioural intention	Cross-sectional	Mobile technology
Ju, Wathanaporn, & Do (2008)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Lu & Viehland (2008)	TAM	Usage behaviour	Cross-sectional	Mobile learning
van Biljon & Kotze (2008)	TAM + UTAUT	Usage behaviour	Cross-sectional	Mobile phone
Huang, Lin, & Chuang (2007)	TAM	Behavioural intention	Cross-sectional	Mobile learning
Saadé, Nebebe, & Tan (2007)	TAM	Behavioural intention	Longitudinal	Multimedia learning
Ramayah & Norazah (2006)	TAM	Behavioural intention	Cross-sectional	Mobile technology
Teo & Pok (2003)	TPB	Behavioural intention	Cross-sectional	Mobile phone
Venkatesh & Morris (2000)	TAM	Usage behaviour	Longitudinal	Software system

The user acceptance model being used in this study is adapted from TAM (Davis, Bagozzi, & Warshaw, 1989) and its extension models (Venkatesh, 2000; Venkatesh & Davis, 2000). Table 2.6 depicts the findings on the relationship of variables based on studies that utilizes TAM. Most studies investigated and found significant relationships on the variables of PU, PE and BI, but other studies also concluded relations which were non-significant. Thus, further analysis incorporating the main variables of TAM should be conducted especially focusing on specific technology usage behavior as in mobile technology.

Table 2.6

Types of relations found in TAM studies

Study	**Area**	**PE-PU**	**PU-AT**	**PE-AT**	**PU-BI**	**PE-BI**	**AT-BI**	**BI-U**	**PE-U**	**PU-U**
Chin & Vimala (2017)	Mobile technology				No	No				
Seyal *et al*. (2015)	Mobile learning	Yes	Yes	No	Yes		Yes			
Ursavas (2015)	Tablet PC				Yes	No				
Cheng (2014)	Mobile learning	Yes			Yes	Yes				
Joo, Lee, & Ham (2014)	Mobile learning	Yes			No	Yes				
Mac Callum, Jeffrey, & Kinshuk (2014)	Mobile learning	No			Yes	No				
Chen *et al*. (2013)	Web-based application	Yes			Yes	Yes				
Sujeet Kumar & Jyoti Kumar (2013)	Website				Yes	Yes	Yes			
Tarhini, Hone, & Liu (2013)	e-learning				Yes	Yes		Yes		
Wong *et al*. (2013)	Computer	Yes	Yes	No	Yes		Yes			
Chen & Tseng (2012)	e-learning	Yes			Yes	Yes				
Nasri & Charfeddine (2012)	Facebook	Yes	Yes	Yes			Yes			

Tan *et al*. (2012)	Mobile learning	Yes			Yes	Yes				
Lee, Hsieh, & Hsu (2011)	e-learning	Yes			Yes					
Tolentino (2011)	Web portal	No	Yes	Yes	Yes	No	Yes			
Tselios, Daskalakis, & Papadopoulou (2011)	Blended learning	Yes	Yes	Yes	Yes		Yes			
Akour (2009)	Mobile learning	Yes	Yes	Yes	Yes		Yes			
Conci, Pianesi, & Zancanaro (2009)	Mobile phone	Yes			Yes	Yes				
Kim & Garrison (2009)	Mobile technology	Yes			Yes	Yes				
Theng (2009)	Mobile learning	Yes			Yes	Yes				
Farzana & Ainin (2008)	Mobile device	Yes			Yes					
Ju, Wathanaporn, & Do (2008)	Mobile learning	Yes	Yes	No	No					
van Biljon & Kotze (2008)	Mobile phone				Yes	Yes		Yes	No	No
Huang, Lin, & Chuang (2007)	Mobile learning	Yes	Yes	Yes	Yes		Yes			
Saadé, Nebebe, & Tan (2007)	Multimedia learning	Yes	Yes	Yes	No		Yes			
Ramayah & Norazah (2006)	Mobile PC	Yes	Yes	Yes	Yes		Yes			
Venkatesh & Morris (2000)	Computer	Yes			Yes	Yes				

*Yes: relation is significant and positive; No: relation is non-significant; Blank: relation is not measured

From literature review, external variables were also identified and included in the research model to provide a better understanding of what influences the main variables of PU, PE and BI (Legris, Ingham, & Collerette, 2003). Table 2.7 presents the external variables used in TAM studies and it is observed that recurrent variables adopted as external variables were self-efficacy, subjective norms/social influence, anxiety, experience and facilitating conditions.

Table 2.7

External variables in TAM studies

Study	**Area**	**External Variables**
Cheng (2014)	Mobile learning	Personal innovativeness
Joo, Lee, & Ham (2014)	Mobile learning	User interface, personal innovativeness
Mac Callum, Jeffrey, & Kinshuk (2014)	Mobile learning	Anxiety, mobile literacy, ICT literacy
Songpol, Bruner II, & Neelankavil (2014)	Tablet	Self-efficacy
Teo & Zhou (2014)	Computer	Self-efficacy, subjective norm, facilitating conditions
Chen *et al*. (2013)	Web-based application	Perceived enjoyment, anxiety, self-efficacy, social influence
Mbarek & Zaddem (2013)	e-learning	Self-efficacy
Sujeet Kumar & Jyoti Kumar (2013)	Website	Computer self-efficacy, perceived web quality
Tarhini, Hone, & Liu (2013)	e-learning	Subjective norm, quality of work life
Chen & Tseng (2012)	e-learning	Internet self-efficacy, computer anxiety, motivation
Punnoose (2012)	e-learning	Computer self-efficacy, subjective norms
Holden & Rada (2011)	Computer	Self-efficacy
Akour (2009)	Mobile learning	Readiness, ease of access, quality of service, extrinsic influence, university commitment
Conci, Pianesi, & Zancanaro (2009)	Mobile phone	Social influence, support, self-actualization, enjoyment, perceived safety
Kim & Garrison (2009)	Mobile technology	Perceived ubiquity, perceived reachability, job relevance
Park (2009)	e-learning	E-learning self-efficacy, subjective norm, system accessibility
Theng (2009)	Mobile learning	Mobile self-efficacy, mobile prior experience, accessibility, communication
Ju, Wathanaporn, & Do (2008)	Mobile learning	Perceived self-efficacy
Lu & Viehland (2008)	Mobile learning	Subjective norm, self-efficacy, prior use of e-learning, perceived financial resources

van Biljon & Kotze (2008)	Mobile phone	Social influence, facilitating conditions
Huang, Lin, & Chuang (2007)	Mobile learning	Perceived enjoyment, perceived mobility value
Ong & Lai (2006)	e-learning	Computer self-efficacy
Park (2006)	Mobile learning	Subjective norm, self-efficacy, computer experience, support, relative advantage, compatibility
Lu *et al*. (2003)	Mobile technology	Social influences, facilitating conditions, system complexity, wireless trust environment
Teo & Pok (2003)	Mobile phone	Self-efficacy, relative advantage, image, compatibility, risk, government, mobile operator
Kwon & Chidambaram (2000)	Mobile phone	Social pressure, enjoyment, apprehensiveness
Venkatesh & Morris (2000)	Computer	Subjective norm

Besides external variables, some studies have also incorporated several types of moderators in accordance to the UTAUT model (Venkatesh et. al., 2003) to further enhance the explanatory power of the model and refine the inconsistency findings of the studies (Sun & Zhang, 2006). Table 2.8 shows the moderator variables being utilized in the related studies. It can be noted that the most common moderators being employed are age, gender and experience.

Table 2.8

Moderator variables in technology acceptance studies

Study	**Area**	**Moderator Variables**
Moryson & Moeser (2016)	Mobile services	Age, gender, experience
Guo (2015)	Mobile services	Gender
Jackman (2014)	Mobile learning	Age, gender
Khechine *et al*. (2014)	Blended learning	Age, gender
Tarhini, Hone, & Liu (2014)	e-learning	Age, gender, experience, education level
Manimekalai (2013)	Mobile technology	Age, gender
Aguirre-Urreta & Marakas (2010)	Computer software	Gender, self-esteem, self-efficacy

Ktoridou & Eteokleous (2010)	Wireless technology	Age, gender, major of study
Rudito (2010)	Mobile broadband	Cultural orientation, openness and technology readiness
Wang, Wu, & Wang (2009)	Mobile learning	Age, gender, experience, voluntariness of use
Im, Kim, & Han (2008)	Web-based application	Gender, experience
Arning & Ziefle (2007)	PDA	Age, gender, expertise
Napaporn (2007)	ICT	Age, gender, education, academic position, experience, e-university, research university, reading and writing, Thai language (cultural aspects)
Ong & Lai (2006)	e-learning	Gender
Venkatesh & Davis (2000)	Software programs	Experience, voluntariness
Venkatesh & Morris (2000)	Computer	Gender, experience

As such, the above discussion and summary on the theories of technology acceptance along with its main constructs, external variables and moderators are being used as a principle in constructing the conceptual framework of this study.

2.11 Conceptual Framework

A conceptual framework is derived from theoretical framework which focuses on the specific research problem and becomes the basis of the study (Ranjit, 2011). In other words, the researcher describes the aspects being selected from the theoretical framework and makes a logical sense of the relationships among the variables being identified. A conceptual framework actually helps the researcher to hypothesize and test the related relationships in order to examine whether the theory formulated is valid or not. Figure 2.16 displays the conceptual framework of the study.

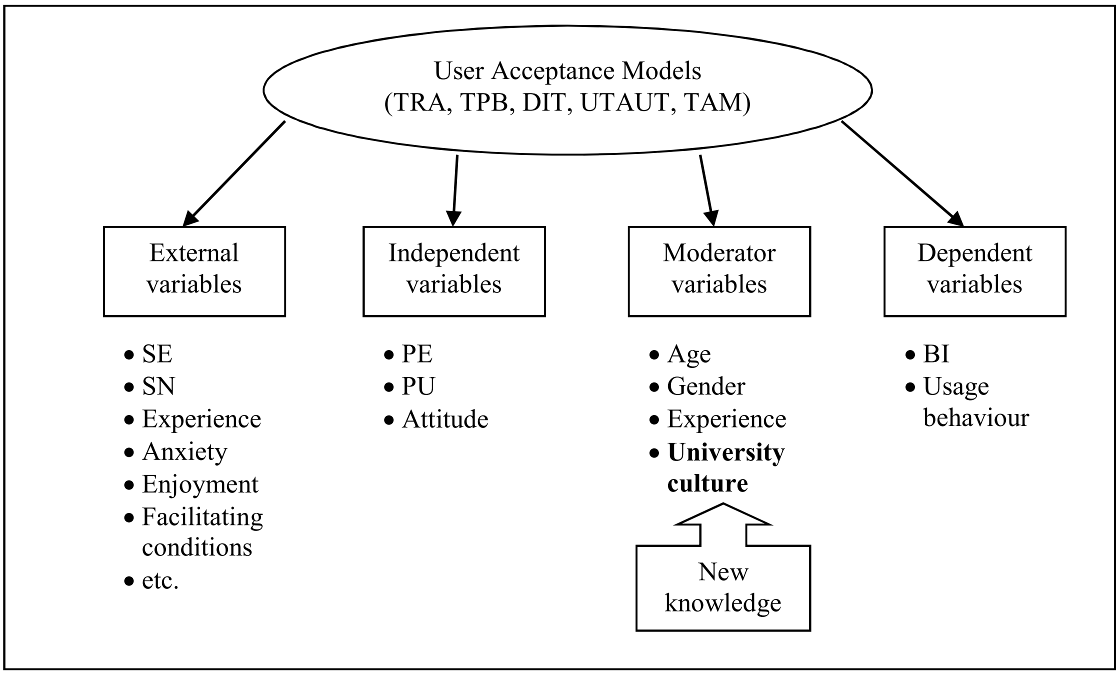


Figure 2.16. Conceptual framework

2.12 Research Framework

The research framework or the proposed research model for this study consists of three important types of variables which are independent variables, dependent variable and moderator variables. From the literature on TAM research, this study on the acceptance of mobile technology among English language lecturers adapts the TAM and TAM2 (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000) which includes the independent variables of perceived usefulness (PU) and perceived ease of use (PE). In addition, literature has also suggested the inclusion of external variables for PU and PE and this study has selected the variables of subjective norms (SN), self-efficacy (SE) and prior mobile technology experience (ME). These external variables have been applied to TAM research on mobile learning, mobile phone technology and other different information technologies focusing mostly on students as technology users. Due to the integration of external variables into the model, the independent variables of PU and PE operate as mediating variables toward the dependent variable of BI.

Reviews on studies related to TAM have also suggested the inclusion of moderator variables to improve the significance of the model in investigating the acceptance of technology (Han, 2003; Lee, Kozar, & Larsen, 2003; Marangunić & Granic, 2015; Sun & Zhang, 2006). Two moderator variables of gender and age are included in this research model as these moderators have also been used in previous literatures (e.g. Arning & Ziefle, 2007; Conci, Pianesi, & Zancanaro, 2009; Gefen & Straub, 1997; Kwon & Chidambaram, 2000; Napaporn, 2007; Ong & Lai, 2006; Venkatesh & Morris, 2000). In addition to this, another moderator of university culture is also inserted into the proposed research model to examine whether the culture of having specific responsibilities among UiTM educators moderates the relationship of these variables. As to this date, the university culture moderator has only been found in Napaporn's study but it is used on the basis of the acknowledgement of being a research university. Several researchers have asserted that cultural background of an organization has an impact on technology usage (e.g. Cooper, 1994; Windschitl & Sahl, 2002; Zakour, 2004), and due to the recognition of UiTM being a teaching university, this study creates items for the university culture variable as a moderator to the relationship between PE and PU with the BI of using mobile technology. Based on the conceptual framework, the hypotheses tested include:

1. whether the external variables (SN, SE & ME) have any significant influence on the independent variables (PU & PE)
2. whether the determinant PE has any significant influence on PU
3. whether the independent variables (PU & PE) have a significant influence on the dependent variable (BI)
4. whether these moderators (gender, age & university culture) have any significant impact on the influence of these determinants (PU & PE) toward behaviour intention (BI).

Figure 2.17 presents the conceptual framework in answering the research questions on the factors that influence UiTM English language lecturers in their intention to adopt mobile technology.

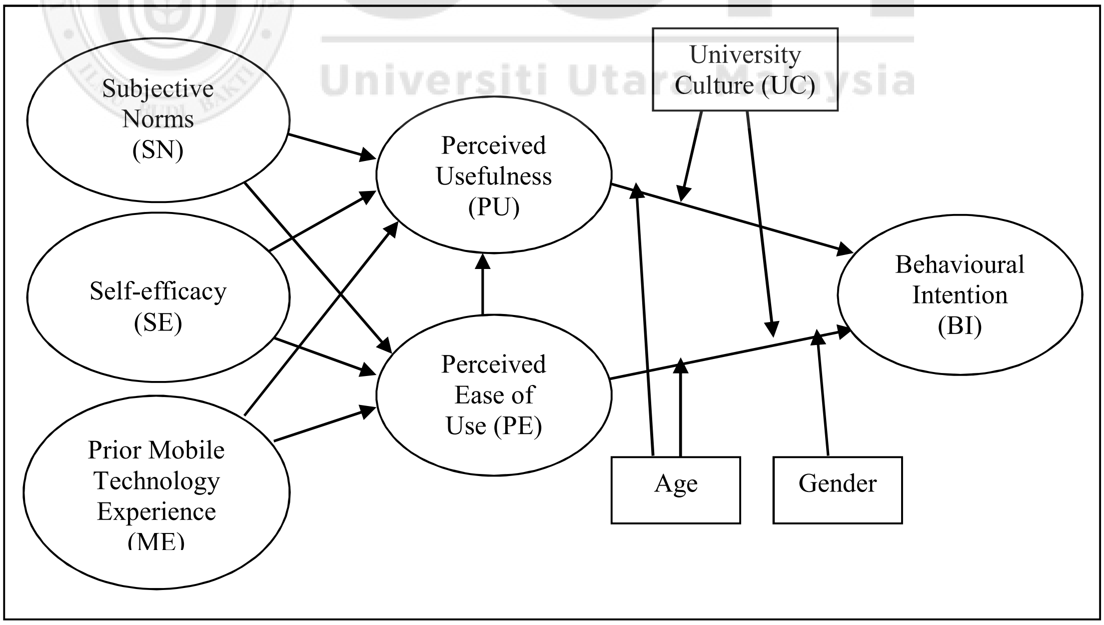


Figure 2.17. Research framework

2.13 Chapter Summary

This chapter presented the literature on several areas related to the study which included the pedagogical approaches of language teaching and the comparison between e-learning and mobile learning approaches, the concepts of mobile teaching and learning together with mobile technology, theories associated to the acceptance of technology including Technology Acceptance Model (TAM), and various research related with these concepts. The analysis on the studies concerning mobile learning, e-learning, and mobile technology with relevance to TAM has led to the identification of variables which are used to construct the research framework for this study. The next chapter discusses on the methodology aspects needed for the fulfillment of this study.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter focuses on the research methodology as to successfully achieve the research objectives that have been set by the researcher. It starts with the explanation on research design, population and sample, research instrument, and analysis on the pilot study which covers the issues of goodness of measures, reliability and validity. Subsequently, the chapter discusses on the procedures of data collection followed with the preliminary analysis which involves data editing and coding, handling missing data and outliers, and testing statistical assumptions. Next, data analysis process involving Structural Equation Modeling (SEM) using Analysis of Moment Structures (AMOS) software is being presented. This section focuses on fulfilling the objectives of the research through the procedures of the measurement model and the structural model, besides describing the methods on the analysis of mediator and moderator variables.

3.2 Research Design

This study was considered a conceptual research since it adopted Technology Acceptance Model (TAM) and used several identified variables based on literature review in order to propose the framework of this research. In addition, this study was deemed as an applied research since the study aimed to discover the variables that influence Universiti Teknologi MARA (UiTM) English language lecturers' behaviour intention towards the usage of mobile technology. This study also fell under the category of descriptive and quantitative type of research as it used a structured and predetermined type of survey instruments to gather data and to fulfill the research objective of proposing a research model.

This study was also a cross-sectional or one-shot study as it only investigated the variables that affect the readiness of the English language academics of UiTM in using mobile technology devices in teaching and learning practices during the period of the study. The aim for adopting a cross-sectional study was to collect data on the factors that influence UiTM English language lecturers' acceptance towards mobile technology at one time in order to test the hypotheses and answer the research objectives. It is also useful in obtaining an overall view as it stands at the time of the study. Besides that, the research was also conducted in its natural environment of the organization which consequently reduced the interference by the researcher towards the process of data collection.

3.3 Population and Sample

Population is defined as "the entire group of people that the researcher wishes to investigate" while the term sample refers to "the members selected from the population" (Sekaran & Bougie, 2013, pp.240-241). The target population of the study consisted of the English language lecturers from the Academy of Language Studies, UiTM campuses. Altogether, there were thirteen UiTM state campuses with all campuses having the Academy of Language Studies. The campuses included those in the state of Kelantan, Terengganu, Pahang, Johor, Melaka, Negeri Sembilan, Selangor, Perak, Pulau Pinang, Kedah, Perlis, Sabah and Sarawak.

Unit of analysis refers to what or who that should provide the data and at what level of aggregation the data should be analyzed (Zikmund, Babin, Carr, & Griffin, 2010). Since this research was interested to investigate the determinants that affect UiTM English language lecturers in their intention to adopt mobile technology, the data were collected from each individual of UiTM English language lecturers. The selection of the English language lecturers was based on the reason that the UiTM English language courses integrate online language learning by conducting quizzes, tests and video viewing through i-Learn portal as part of assessments criteria (Nurmaisara *et al*., 2012; Zarlina *et al*, 2012). As such, the unit of analysis for this research was the individual lecturer or academic staff.

The sample of the study which represented the respondents consisted of the English language lecturers from the Academy of Language Studies, UiTM state campuses. In order to ensure that all English language lecturers in UiTM state campuses had an equal chance or probability to be selected as a sample or respondent, this study employed probability sampling method. This type of sampling is useful as the researcher is able to make generalization on the corresponding group of English language academics since it seeks representativeness of the population (Cohen, Manion, & Morrison, 2007) and has the least biasness effect (Sekaran & Bougie, 2013).

For this research, it used the simple random sampling since its basic characteristic was that every sampling unit in the target population had an equal chance of being selected. According to Zainudin (2010), the process of simple random sampling involves several steps. The first step taken by the researcher is to define the target population from which the sample is selected. For this study, the target population was the English language lecturers from thirteen (13) UiTM state campuses. Even though some of these states have more than one branch campuses (i.e. Kota Bharu and Machang campuses in Kelantan), the Head of Department in the main state campus (i.e. Machang campus) manages all the English language lecturers in that particular state. The information gathered through the Head of Department of Academy Language Studies from all state campuses revealed that the total number of English language lecturers in UiTM was 589 (refer Table 3.1).

After obtaining the total population of the English language lecturers from each campus, the sample size of the study was determined. Based on the table of random sample size (Cohen, Manion & Morrison, 2007), a population of 600 subjects with 95 percent confidence level and 3 percent confidence interval requires a sample size of 234 subjects. However, one issue that needs to be considered in determining the sample size is the non-response error which denotes the failure to obtain information from the respondents included in the sample (Sekaran & Bougie, 2013). Since mail surveys usually have less than 50 percent response rate (Zikmund *et al.*, 2010), the sample size for a study should be the greatest number obtained from the various methods in determining sample size. In this study, the size of the population which represented the English language lecturers in UiTM was small (N=589 subjects); thus, Cohen, Manion and Morrison (2007) suggested to double the sample size to overcome the problem of low response rate. As such, the researcher decided to use 589 UiTM English language lecturers as the target sample of this research. Table 3.1 depicts the population of the English language lecturers and the samples' percentages for each UiTM state campus.

Table 3.1
Population and Sample Percentage of English language lecturers in UiTM state campuses

State Campus	Population of English Language Lecturers	Percentage of Sample
Johor	42	7.1%
Kedah	31	5.3%
Kelantan	38	6.5%
Melaka	62	10.5%
Negeri Sembilan	33	5.6%
Pahang	36	6.1%
Perak	51	8.6%
Perlis	29	4.9%
Pulau Pinang	30	5.2%
Sabah	20	3.3%
Sarawak	38	6.5%
Selangor	145	24.7%
Terengganu	34	5.7%
TOTAL	**589**	**100%**

In order to increase the response rate for this study, the researcher accompanied the questionnaire with a cover letter which explained the purpose of the study, its confidentiality, selection method, the time involved to answer the questionnaire and invitation to response within certain period of time. In addition, the researcher was assisted by the Head of Academy of Language Studies in each campus to distribute and collect the questionnaires to the English language lecturers. The duration of time to distribute and collect the questionnaires from the respondents for all 13 state campuses was about 3 months starting from the month of August to October 2015.

3.4 Research Instrument

The major approach in gathering the information to fulfill this research was through the collection of primary data using a questionnaire technique. A questionnaire is defined as a written list of questions to which the respondents will read, interpret what is expected and record the answers (Ranjit, 2011). The questionnaire items used in this study involved the main constructs of subjective norms (SN), self-efficacy (SE), prior mobile technology experience (ME), perceived usefulness (PU), perceived ease of use (PE) and behavioural intention (BI) of the conceptual framework which had been reviewed and adapted from Technology Acceptance Model.

3.4.1 Questionnaire Development

In developing the questionnaire for this study, the researcher used the items from previous literature for the selected constructs of subjective norms (SN), self-efficacy (SE), prior mobile technology experience (ME), perceived usefulness (PU), perceived ease of use (PE) and behavioural intention (BI). The instruments were developed in order to collect data on the English language lecturers' perception towards mobile technology usage. The items for these constructs were adapted from prior research since they had been widely used and proven statistically to predict the intention of using certain technology. These measurement items were adapted from studies of mobile learning (Akour, 2009; Wang, Wu, & Wang, 2009), mobile technology (Theng, 2009), mobile phone (Reinders, 2010), internet usage (Napaporn, 2007), and new system adoption (Venkatesh, 2000; Venkatesh & Davis, 2000; Venkatesh, *et al*., 2003). In addition, the selected items from these studies (Akour, 2009; Napaporn, 2007; Venkatesh, 2000; Venkatesh & Davis, 2000; Venkatesh, *et al*., 2003; Wang, Wu, & Wang, 2009) had acceptable composite reliability values of more than 0.7 (Hair, Black, Babin, & Anderson, 2010). However, the items for university culture (UC) which acted as a moderator in the research model were newly constructed based on the literature of Kamaruzaman and Siti Akmar (2009) and Ruhil Hayati *et al*. (2006). Table 3.2 summarizes the instrument items taken from the respective sources.

Table 3.2

List of constructs indicators

Construct		Source
Behavioural intention (BI)		
BI1	I intend to use mobile phone in my teaching practices.	
BI2	I predict I would use mobile phone in my teaching practices.	Akour (2009);
BI3	I plan to use mobile phone in my teaching practices.	Wang, Wu, &
BI4	I would enjoy using mobile phone for teaching purposes.	Wang (2009)
BI5	I would recommend others to use mobile phone for teaching purposes.	
Perceived usefulness (PU)		Akour (2009); Wang, Wu, & Wang (2009)
PU1	Using mobile phone would likely improve my teaching performance.	
PU2	Using mobile phone would likely increase my teaching productivity.	

PU3	Using mobile phone would likely enhance the effectiveness of my teaching practices.	
PU4	Using mobile phone would likely be useful in my teaching practices.	
PU5	Using mobile phone would likely enable me to accomplish teaching tasks more quickly.	
Perceived ease of use (PE)		
PE1	I would likely find my interaction with mobile phone to be clear and understandable.	
PE2	I would likely find mobile phone easy to use.	Akour (2009); Venkatesh & Davis (2000); Wang, Wu, & Wang (2009)
PE3	I would likely find it easy to get mobile phone to do what I want it to do.	
PE4	I would likely find mobile phone flexible to interact with.	
PE5	I would likely find my interaction with mobile phone does not require a lot of my mental effort.	
PE6	I would likely find it easy for me to be skillful at using mobile phone.	
Subjective norm (SN)		
SN1	People who influence my behaviour think that I should use mobile phone in my teaching practices.	
SN2	People who are important to me think that I should use mobile phone in my teaching practices.	Napaporn (2007); Venkatesh *et al*. (2003); Wang, Wu, & Wang (2009)
SN3	My students think that I should use mobile phone in my teaching practices.	
SN4	My peers think that I should use mobile phone in my teaching practices.	
SN5	The lecturers in my faculty have been helpful in the use of mobile phone in my teaching practices.	
SN6	In general, the organization has supported the use of mobile phone in my teaching practices.	
Self-efficacy (SE)		
SE1	I could complete a task using mobile phone if no one is around to tell me how to use it.	
SE2	I could complete a task using mobile phone if I could call someone for help if I got stuck.	
SE3	I could complete a task using mobile phone if someone shows me how to do it first.	Theng (2009); Venkatesh *et al*. (2003); Venkatesh (2000)
SE4	I could complete a task using mobile phone if someone helps me to get started.	
SE5	I could complete a task using mobile phone if I have a lot of time to do it.	
SE6	I could complete a task using mobile phone if I have never used a product like it before.	
SE7	I could complete a task using mobile phone if I have the built-in help facility for assistance.	
Prior mobile technology experience (ME)		
ME1	I am able to access information on the internet using mobile phone.	
ME2	I am able to send and read emails using mobile phone.	
ME3	I am able to send and receive Short Messaging System (SMS).	Reinders (2010); Theng (2009)
ME4	I am able to send and receive Multimedia Messaging System (MMS).	
ME5	I am able to use mobile phone to play games.	

ME6	I am able to use mobile phone for social networking activities.	
ME7	I am able to write notes using mobile phone application.	
University culture (UC)		
UC1	UiTM is a highly reputable teaching university.	
UC2	UiTM plans to be a research university in the future.	
UC3	UiTM lecturers need to fulfill the teaching hours of 16 to 18 hours a week.	
UC4	UiTM lecturers need to teach using various approaches (i.e. face-to-face, e-learning, blended learning, mobile learning).	Kamaruzaman & Siti Akmar (2009); Ruhil Hayati *et al*. (2006)
UC5	UiTM lecturers need to obtain grants and conduct research.	
UC6	UiTM lecturers need to produce publications of professional reports (i.e. journal articles).	
UC7	UiTM lecturers need to present papers in conferences.	
UC8	UiTM lecturers need to perform professional service duties to the faculty and/or university (i.e. administration and committee work).	
UC9	UiTM lecturers need to perform professional service duties to the community (i.e. consultancy and community activities).	

The constructs above were measured using a seven-point Likert-type scale ranging from strongly disagree = 1, quite disagree = 2, slightly disagree = 3, neutral = 4, slightly agree = 5, quite agree = 6 and strongly agree = 7 (Napaporn, 2007). The seven alternatives were used because rating scales with fewer than 5 scale points tend to result in lower reliability estimates (Weng, 2004). In addition, researchers were advised to label all response options and to include a neutral midpoint as it may reduce the risk of respondents giving incorrect response to reversed items (Weijters, Cabooter, & Schillewaert, 2010).

As noted by Hair *et al*. (2010), it is important to identify the type of measurement scale for every variable used in the study because it influences the appropriate type of statistical analysis. The dependent and independent variables of BI, PU, PE, SN, SE and ME are metric data using interval measurement scales. It also applies to the moderator variable university culture as it is measured using seven-point Likert-type scale (Sekaran & Bougie, 2013). The moderator variable gender is a nonmetric data which uses nominal scales since gender can be represented by assigning numbers to each category (i.e. numerical value 1 for male and 2 for female). Lastly, the moderator age is assigned as a non-metric data using interval scales as the respondents select an appropriate age value based on the given age category responses (e.g. 20-29 years, 30-39 years, 40-49 years, etc.). The interval scale is chosen because the nature of the variables permits its application and it provides the most precise description (Kothari, 2004) by using more powerful statistical analysis (Cohen, Manion, & Morrison, 2007). In addition, most researchers usually treat the Likert scale containing five or more categories of response as interval scale type of measurement (Zikmund *et al*., 2010). In order to test the variables using Statistical Package for the Social Sciences (SPSS), the scale of measurement has to be converted into nominal or ordinal scale (Singh, Puzziawati, & Teoh, 2009), which means the age category responses are coded using frequency categories (i.e. numerical value 1 for 20-29 years category etc.). For Likert scale data, (i.e. university culture), Boone Jr. and Boone (2012) suggested the use of mean values to describe the scale variable and conduct statistical analysis. However, since this study uses the structural equation model as its statistical tool, the Likert scale data is analysed using parametric statistics with the assumption that the interval data is normally distributed (Norman, 2010; Sullivan & Artino Jr., 2013).

The questionnaire is structured and separated into the following sections:

1. Section A comprises of 15 questions that focus on the demographic profile which includes age, gender, academic level, job position, state campus, and mobile technology experience
2. Section B focuses on 9 items that represent university culture (UC) as a moderator variable
3. Section C contains 5 items on the construct of behavioural intention (BI) as a dependent variable
4. Section D presents 5 items on the construct of perceived usefulness (PU) as an independent variable
5. Section E comprises 6 items on the construct of perceived ease of use (PE) as an independent variable
6. Section F contains 6 items on the construct of subjective norm (SN) as an external variable
7. Section G includes 7 items on the construct of self-efficacy (SE) as an external variable
8. Section H presents 7 items on the construct of prior mobile technology experience (ME) as an external variable.

Appendix A presents the questionnaire developed for the purpose of this thesis.

3.5 Goodness of Measures

In establishing the instruments for a research, it is known that researchers would adapt or modify an established measure to suit the setting of the problem being investigated. Since the environment in each study case is different, the wordings in the instrument may have to be suitably adapted or replaced with others. In doing so, the researcher has actually tampered the established scale from previous research and as such, it is advisable for the researcher to conduct goodness of measures on the adapted instruments for the adequacy of validity and reliability (Sekaran & Bougie, 2013).

3.5.1 Instrument Reliability

A research is considered reliable if it measures whatever concept it is measuring which is indicated through the ability of its measure to remain the same over time and the homogeneity of the items in the measure (Sekaran & Bougie, 2013). This research measures the reliability of the instruments using the internal consistency test which provides a Cronbach's coefficient alpha as each item is correlated with the sum of all the other relevant items (Cohen, Manion, & Morrison, 2007). This actually tests the consistency of the respondents in answering all of the items in the measurement.

According to Sekaran and Bougie (2013), reliability coefficients of less than 0.60 are considered to be poor, those in the 0.70 range are acceptable and those over 0.80 are considered good. In most research, Cronbach's alpha coefficient ranging from 0.7 and above is generally acceptable. In addition, the rule of thumb for reliability estimate is 0.7 or higher which suggests good reliability while reliability between 0.6 and 0.7 may be acceptable if the model's construct validity is good (Hair *et al*., 2010).

3.5.2 Instrument Validity

Validity is the accuracy of a measure in assessing a concept that it represents (Zikmund *et al*., 2010) and it can be achieved by selecting and devising appropriate instrumentation for gathering data (Cohen, Manion, & Morrison, 2007). This can be done by testing the goodness of measures through content validity and construct validity.

Content validity is conducted to ensure that the measure covers adequate and representative set of items related to the concept which can be done through a panel of experts who attest the content validity of the instrument (Sekaran & Bougie, 2013). On the other hand, construct validity is evaluated through multitrait multimethod matrix of correlations. According to Schumacker and Lomax (2010), the multitrait multimethod matrix conveniently displays the convergent validity coefficients, discriminant validity coefficients and the reliability coefficients along the diagonal. Reliability coefficients indicate the internal consistency of scores on the instrument which should be in the range 0.85 to 0.95 or higher; convergent validity coefficients are correlations between measures of the same construct using different methods which should be in the range 0.85 to 0.95 or higher; and discriminant validity coefficients are correlations between measures of different constructs using the same method which should be much lower than the convergent validity coefficients or the instrument reliability coefficients (Schumacker & Lomax, 2010, pp.277-278).

3.6 Pilot Study

The pilot study was conducted to gain feedback on the reliability, validity and practicality of the questionnaire; identify omissions, redundant and irrelevant items; check time taken to complete the questionnaire; and try out the coding system for data analysis (Cohen, Manion, & Morrison, 2007). This study performed the pilot study on a sizeable and representative number of respondents which consisted of 62 part-time English language lecturers in UiTM state campuses.

Reliability of the instrument was conducted on the data collected from the pilot study to test the internal consistency reliability, inter-item correlation and item-to-total correlation (Hair *et al*., 2010). Table 3.3 shows the Cronbach's coefficient alpha for the pilot study of 62 cases and internal consistency measures.

Table 3.3
Instrument reliability of the pilot study

Measurement Items	Items	Cronbach's Alpha	Reliability	Inter-item Correlation	Item-to-total Correlation
Behavioural intention (BI)	5	0.969	good	0.791-0.932	0.876-0.953
Perceived usefulness (PU)	5	0.973	good	0.807-0.952	0.877-0.954
Perceived ease of use (PE)	6	0.969	good	0.744-0.916	0.833-0.937
Subjective norm (SN)	6	0.933	good	0.585-0.936	0.740-0.866
Self-efficacy (SE)	7	0.921	good	0.404-0.871	0.559-0.868
Prior mobile technology experience (ME)	7	0.936	good	0.519-0.921	0.724-0.917
University culture (UC)	9	0.875	good	0.127-0.871	0.401-0.832

The Cronbach's alpha values that represented the internal consistency reliabilities of the measurement items were greater than 0.8 and considered good which indicated that the items in each construct can be used to collect data in the actual study. It has also been suggested that inter-item correlation exceeds 0.3 and item-to-total correlation exceeds 0.5 (Robinson, Shaver & Wrightsman, 1991). For the pilot study, all items fulfilled the requirement of the correlation values except for 2 items in university culture construct (UC2 & UC3) which had a value of less than 0.5 for item-to-total correlation. In comparison, the items UC3 and UC6 had inter-item correlation values of 0.127 and 0.871 respectively which explained the wide range of difference (refer Appendix B). As the items in this construct (UC) were newly developed for this study, further examination on those items was conducted in data analysis procedure using the actual data.

Content validity for this study was achieved through a panel of experts who verified the contents of the instrument (Sekaran & Bougie, 2013). Two experts from the Faculty of Information Management and Faculty of Computer and Mathematical Sciences of UiTM provided their judgments on the TAM constructs (BI, PU, PE, SN, SE& ME) to check if the items corresponded with the concept being investigated. In addition, the items for the newly developed construct UC were reviewed by two personnel with academic, research, publication and administrative knowledge of UiTM; Deputy Rector (Research & Industrial Linkages) and Deputy Dean (Academic) of UiTM Kelantan. Appendix C displays the acknowledgement letter of content validity and comments for the questionnaire items.

3.7 Data Collection

This study utilized the usage of questionnaire as its primary method of data collection especially in fulfilling the objectives of investigating the factors that influence English language lecturers' behavioural intention towards using mobile technology. It was conducted in thirteen UiTM state campuses involving the English language lecturers serving under the Academy of Language Studies.

The initial step in collecting the data was to contact the Head of Academy of Language Studies from the state campuses in order to obtain the list of names of the English language lecturers in each campus. Since the total population was only 589 individuals, the researcher decided to distribute the questionnaires to all UiTM English language lecturers. In addition, the researcher was concerned with the response rate of this study; thus, the total number of questionnaires for each state campus was packed and mailed to the Head of Academy of Language Studies who became the person in-charge for distributing and collecting the questionnaires. The researcher personally contacted the Heads of Academy of Language Studies to inform them on the objectives of the study, to explain the cover letter and the content of the questionnaire, to clarify the period of time for the survey and when the questionnaires should be sent back to the researcher, and to request them to distribute and collect the questionnaires to the respondents. Finally, the researcher also enclosed a self-addressed envelope with postage on it for the Head Academy of Language Studies to return the completed questionnaire. This procedure was done to help increase the response rate of the sample size so that statistical analysis can be conducted effectively.

3.8 Data Analysis

The method used to gather data for this research was by distributing questionnaire to the English language lecturers in UiTM branch campuses. Once the data was gathered through the questionnaire instrument, the researcher conducted preliminary steps which included data editing, data coding and data entry to ensure the data was ready for further analysis (Zainudin, 2010).

3.8.1 Data Editing and Coding

During data editing, the researcher checked for questionnaire errors and omissions, and adjusts or reconstructs the data before data coding was performed. In handling problems on omissions or blank responses, the researcher decided to deduce a logical answer after looking at the respondent's pattern of responses (Sekaran & Bougie, 2013).

Data coding involves assigning numerical score or symbol to each question or item in the questionnaire (Zikmund *et al*., 2010) including missing or non-responses data which is usually assigned with a code such as a numeric value of '9' or '99' (Sekaran & Bougie, 2013; Zikmund *et al*., 2010). A coding sheet was used to list all variables and assign code for each response. For this research, the codes assigned would include university culture (UC), behavioural intention (BI), perceived usefulness (PU), perceived ease of use (PE), subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME).

Data entry for this research involved a direct input of the coded data using the Statistical Package for the Social Sciences (SPSS) software version 20.0 that allowed manipulation and transformation of the raw data into useful information. The researcher also ensured that the data was entered correctly by visually checking all data and by using error edit routines developed in SPSS version 20.0 (Zainudin, 2010).

Once data entry procedure was completed, the process of data analysis was performed to accomplish the research objectives, attend to the research questions and examine the research hypotheses. For this research, data analysis procedure was separated into two major stages. The first stage required the researcher to test reliability and validity of the measurement items, and presented descriptive statistics for demographic variables. For the second stage, the researcher conducted the testing of the measurement models to analyse the relationships of the variables (i.e. SN and PU) through SEM procedures using the Analysis of Moment Structures (AMOS) software. In short, this study adopted multivariate data analysis since the research framework analyzed multiple variables simultaneously. Before data analysis procedures are conducted, it is necessary to initially carry out data examination in which the researcher "evaluates the impact of missing data, identifies outliers and tests for the assumptions underlying most multivariate techniques" (Hair *et al*., 2010, p.33).

3.8.2 Data Examination

Data examination is a necessary process to be conducted before applying any multivariate techniques of analysis in order to gain a better understanding on the data, prescribe reasoned perspective for data interpretation (Hair *et al*., 2010) and provide proof that the collected data is normally distributed so that it meets the requirement to employ parametric statistical test (Zainudin, 2010). As such, the researcher is required to perform an evaluation on missing data, identify outliers and test for assumptions underlying multivariate techniques.

3.8.2.1 Missing Data

Missing data issue has to be addressed as it can reduce the availability of sample size for analysis (Hair *et al*., 2010) which then produces serious bias conclusions on its statistical analysis (Byrne, 2010). Since missing data could not be classified as ignorable, the researcher determined the extent of missing data by calculating "the percentage of variables with missing data for each case and the number of cases with missing data for each variable" (Hair *et al*., 2010, p.47). If the calculation for missing data is below 10 percent for an individual case, it can be generally ignored; variables with 20 to 30 percent levels of missing data should be remedied; while those with 50 percent or more missing data should be deleted (Hair *et al*., 2010).

The researcher then identified whether the missing data is either missing at random (MAR) or missing completely at random (MCAR) (Byrne, 2010) before the researcher selected which imputation method (using valid data, using known replacement values, calculating replacement values and using model-based methods for MAR missing data) to be used (Hair *et al*., 2010). Another way to handle incomplete data is by using listwise deletion, pairwise deletion, imputation (mean, regression or pattern-matching) and model-based methods (Byrne, 2010). In model-based method, estimated values based on predictive distribution of scores that represents the pattern of missing data are used to replace the missing values. In SEM applications, the method used is based on maximum likelihood (ML) estimation that offers several advantages such as ML estimates are both consistent and efficient, asymptotically unbiased, able to yield standard error estimates and provide a method for testing hypothesis (Byrne, 2010).

3.8.2.2 Outliers

Outliers correspond to cases with scores that are substantially different from all the other set of data (Byrne, 2010) which occur due to errors made during observation, data entry, instrument or self-report data (Schumacker & Lomax, 2010). Since they can affect the mean, standard deviation and correlation values, they should be explained, deleted or accommodated by using robust statistics or acquiring additional data to fill-in. The researcher identified the outliers using univariate detection method by converting the data values to standardized scores and checking for values exceeding ±2.5 on each of the variables. The outlier is deleted if it is considered truly abnormal and not a representative observation of the population (Hair *et al*., 2010). In addition, the researcher also detected multivariate outliers using the computation of the squared Mahalanobis distance (D^2) in which an outlier had a distinctive D^2 value as compared to all other D^2 values (Byrne, 2010).

3.8.2.3 Testing Statistical Assumptions

Since multivariate techniques are based on a fundamental set of assumptions representing the requirements of underlying statistical theory, it is necessary to test these assumptions that could possibly affect its statistical technique. The statistical assumptions include normality, homoscedasticity, linearity and correlated errors (Hair *et al*., 2010).

The data for the research fulfills the normality condition depending on the shape of the distribution and sample size. The shape of the distribution is described by the measures of kurtosis (height of the distribution) and skewness (balance of the distribution). A normal distribution would have zero values for both kurtosis and skewness (Hair *et al*., 2010). However, skewness and kurtosis measurements of less than 3.0 and 10.0 respectively meets normality of the data (Kline, 2011) and can further employ parametric statistical analysis (Zainudin, 2010). Besides considering the shape of the distribution, sample size of less than 50 cases can also affect the normality of the data. As such, this research intends to gather data of more than 200 cases to reduce the detrimental effects of nonnormality (Hair *et al*., 2010).

Homoscedasticity denotes the equal variance value of the dependent variable across the values of independent variables which can be tested using the Levene test in SPSS program (Hair *et al*., 2010). Linearity can be visualized by plotting the coordinating pairs of data points of two continuous variables in a scatterplot (Schumacker & Lomax, 2010) which shows a straight line if the relationship is linear (Hair *et al*., 2010). Lastly, correlated errors can be identified by grouping and examining the different patterns on the values of a suspected variable and they can be corrected by incorporating the omitted causal factor into the multivariate analysis (Hair *et al*., 2010).

3.8.3 Descriptive Statistics

Descriptive statistics is conducted to describe the characteristics of the sample and assess the distribution of data across demographic characteristics of the respondents (Zikmund *et al*., 2010) which include frequencies, measures of central tendency and measures of central dispersion. Frequencies and percentages for demographic data are visually presented in table form to display the total number of times that certain observations occur. Measures of central tendency involve the analysis of nominal and interval data for mean, median and mode while measures of dispersion include the calculation of range, variance, and standard deviation values (Sekaran & Bougie, 2013; Zikmund *et al*., 2010).

3.8.4 Structural Equation Modeling (SEM)

The main objective of this study was to test the relationship among variables and identify the factors that affect the intention of UiTM English language lecturers to integrate mobile technology in their teaching practices. For that purpose, this study employed the Structural Equation Modeling (SEM) because it applied the combination of two multivariate techniques which were confirmatory factor analysis and multiple regression analysis (Hair *et al*., 2010).

SEM has been widely used in research due to several reasons: (1) it allows statistical testing of complex phenomena and more advanced theories through multiple independent and dependent variables (Schumacker & Lomax, 2010); (2) it simultaneously assess individual constructs, mediating and moderation effects, as well as the fitness of the overall model in which the Ordinary Least Square (OLS) regression could not consider doing so (Zainudin, 2012); and (3) SEM technique in confirmatory factor analysis enhances the validity and reliability analysis of observed variables by considering and handling correlated measurement errors among the response items (Schumacker & Lomax, 2010; Zainudin, 2012).

It should be noted that SEM can only be applied if the research model is developed based on a strong theoretical basis (Hair *et al*., 2010). This study employed TAM (Davis, 1989) which was adapted from Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and through literature, the researcher identified the variables and specified the relationships among the variables in order to fulfill the main objective of the study which was to identify the factors that influence UiTM English language lecturers in their intention to adopt mobile technology in their teaching practices.

SEM analysis involves latent/construct variables (not directly observable variables) and observed/indicator variables (directly measured variables) (Schumacker & Lomax, 2010). For example, SN is the latent variable which is measured by a set of observed items in the questionnaire. In addition, SEM analysis employs two types of models namely the measurement model and the structural model. The measurement model forms the latent variables and defines relations between the observed and unobserved variables (e.g. SN variable has six questionnaire items) whereas the structural model defines relations among unobserved variables and demonstrates the hypothesized inter relationships among the measurement models in the study (e.g. SN variable with PU variable) (Byrne, 2010; Zainudin, 2012).

In SEM, changes in the values of exogenous construct (independent variable) is influenced by other factors outside the model (Byrne, 2010) and is visually depicted by not having any paths from any other constructs going into it (Hair *et al*., 2010). In contrast, endogenous construct (dependent variable) is directly or indirectly influenced by the exogenous construct (Byrne, 2010) and is visually presented by a path going into it from an exogenous construct (Hair *et al*., 2010). Following to this, path diagrams are developed to describe a set of relationships that involves exogenous and endogenous constructs (Hair *et al*., 2010). Analyzing the path diagram requires the usage of special computer software such as Analysis of

Moment Structures (AMOS) and AMOS has been considered a powerful SEM software as it utilizes graphics representation of the model which specifies, estimates and assesses statistical relationships among the measuring items of each construct and also between constructs (Zainudin, 2012).

3.8.5 Data Analysis Using AMOS

In relation to testing the proposed research framework, the study applied two steps of SEM data analysis approach using the structural equation modelling software AMOS 20. The first step involved testing the fit and construct validity of the measurement model while the second step required the researcher to test the proposed structural model. These two steps covered the six-stage overall process of SEM as recommended by Hair *et al*. (2010) which included the following stages: (1) defining individual constructs; (2) developing and specifying the measurement model; (3) designing a study to produce empirical results; (4) assessing measurement model validity; (5) specifying structural model; and (6) assessing structural model validity.

Stages 1 to 4 utilize the Confirmatory Factor Analysis (CFA) procedure and correspond to the first step of analysis which is to identify model constructs and assess the measurement model validity. The second step is related to stages 5 and 6 which fulfill the requirement of testing, modifying and presenting the structural model in order to identify the factors that affect the intention of UiTM English language lecturers to integrate mobile technology in their teaching practices.

3.8.5.1 Assessing Measurement Model

Using AMOS, the measurement model is formed to show the relations between the observed and unobserved variables (e.g. SN is the latent/unobserved variable which is measured by a set of observed items in the questionnaire). Path diagrams are used to illustrate the measurement models along with its associated measurement error (error related to the observed variable) (Byrne, 2010). The researcher performed CFA procedures for every variables (e.g. SN) and also for all exogenous/independent variables simultaneously (e.g. between SN and SE) to assess the validity of the measurement model by estimating correlational relationships represented by a two-headed curved arrow (Zainudin, 2012). However, CFA can only be performed if the model is derived based on an empirical or conceptual foundation. CFA is considered appropriate to be used in this study since the researcher has some knowledge of the theory which leads to the proposition of relationship between the selected variables (Byrne, 2010).

By performing the CFA, the researcher actually assessed the unidimensionality, validity and reliability of the measurement model. For unidimensionality, the factor loading for an item or its standardized loading estimates should be 0.5 or higher; while convergent validity is achieved when Average Variance Extracted (AVE) value is greater or equal to 0.5; discriminant validity is established when variance-extracted values for two factors are greater than the square of the correlation between the two factors; and construct validity is fulfilled when standardized factor loading is at least 0.5 and preferably 0.7 (Hair *et al*., 2010, p.695, p.722). On the other hand, reliability assessment covers internal reliability (the lower limit for Cronbach's alpha is 0.70); construct reliability (its estimate is 0.7 or higher); and the average percentage of variation (AVE) (the value of 0.5 or higher) (Hair *et al*., 2010, p.125, p.709, p.710).

3.8.5.2 Evaluating Fitness of the Model

According to Hair *et al*. (2010), model validity is achieved when it obtains evidence on its construct validity and establishes acceptable levels of goodness-of-fit (GOF). As presented in Table 3.3, GOF measures are classified into three groups: (1) absolute fit indices (how well the model reproduces the observed data); (2) incremental fit indices (how well the estimated model fits relative to some alternative baseline model); and (3) parsimony fit indices (which model among a set of competing models is the best model) (Hair *et al*., 2010).

Table 3.4

Goodness-of-fit indices

Name of index	Level of acceptance	Comments
Absolute fit indices		
Chi-square (χ^2)	$p > 0.05$	Sensitive to large sample sizes
Goodness-of-fit index (GFI)	GFI > 0.90	Value close to 0 reflects a poor fit, value close to 1 reflects a perfect fit
Root mean square error of approximation (RMSEA)	from 0.05 to 0.08	Value of 0.05 to 0.08 indicate close fit
Root mean square residual (RMR)	Researcher defines level	Indicates the closeness of Σ to S matrices
Standardized root mean residual (SRMR)	SRMR < 0.05	Value less than 0.05 (lower value) indicates a good model fit
Incremental fit indices		
Normed fit index (NFI)	NFI > 0.90	Value close to 0 reflects a poor fit, value close to 1 reflects a perfect fit

Tucker-Lewis index (TLI)	TLI > 0.90	Value close to 0 reflects a poor fit, value close to 1 reflects a perfect fit
Comparative fit index (CFI)	CFI > 0.90	Value close to 0 reflects a poor fit, value close to 1 reflects a perfect fit
Parsimony fit indices		
Adjusted goodness of fit index (AGFI)	AGFI > 0.90	Value close to 0 reflects a poor fit, value close to 1 reflects a perfect fit
Parsimony normed fit index (PNFI)	PNFI > 0.90	Compares values in alternative models
Chisq/df	Chi square/df < 5.0	Value should be below 5.0

(Source: Hair et al., 2010; Schumacker & Lomax, 2010; Zainudin, 2012)

In order to obtain adequate evidence to prove model fit, Hair *et al*. (2010) suggested reporting the Chi-square χ^2 value and degrees of freedom, including at least one absolute fit index (the RMSEA value) and one incremental fit index (the CFI or TLI value) (p.672). Furthermore, Zainudin (2012) also proposed the reporting of RMSEA, GFI, CFI and Chisq/df index measures as they are highly reported in literatures. As such, this study chose to report on the fit indices of Chi-square χ^2 value, degrees of freedom, probability value (P-value), absolute fit measures (CMIN/df and RMSEA), incremental fit measures (NFI and CFI) and parsimony fit measures (AGFI and PNFI).

3.8.5.3 Assessing Structural Model

The next step of data analysis involves the validity test of the structural model through the transformation of the measurement model into the structural model by identifying the exogenous (independent) and endogenous (dependent) constructs. For this research, exogenous constructs include SN, SE and ME, while PU, PE and BI are endogenous constructs. The researcher specified the relationships in the structural model by showing which particular latent variables relate to one another using single-headed arrows for hypothesized causal relationships. However, the assessment of structural model can only be conducted if the measurement model has been validated and achieved acceptable model fit through CFA test (Hair *et al*., 2010).

Once the structural model is presented in path diagram, the model can be estimated and assessed by examining its GOF measures using the Chi-square (χ^2) value and at least one absolute fit index and one incremental fit index. In addition, the CFA model fit and structural model fit should be compared to confirm that the structural model has achieved its model fit. The structural model should have a better χ^2 value than the overall CFA as the structural model needs to explain all the relationships between constructs (Hair *et al*., 2010). In this study, the researcher intended to investigate the causal relationship between exogenous constructs and endogenous constructs. As such, the results from this testing and its modification procedures identified the determinants that influence the acceptance of language lecturers towards mobile technology device.

3.8.5.4 Examining Mediation Effects

The conceptual framework of this research depicts that the variables PU and PE act as mediators towards the endogenous variable of BI in using mobile technology. A mediator variable is an intermediate variable that explains the relationship of two other variables. This means that the exogenous variable predicts the mediator variable which in turn predicts the endogenous variable (Fairchild & McQuillin, 2010). Mediating effect occurs when a construct intervenes between two other constructs and it explains why a relationship between two constructs exists (Hair *et al*., 2010).

Referring to Figure 3.1, the diagram shows the relationship between constructs (i.e. SN and BI) with an intervening variable (i.e. PU) or mediator which clarifies the relationship between the two original constructs. Complete mediation occurs when the mediating construct completely explains the relationship between the two constructs while partial mediation takes place if there is still some relationship between the two constructs that is not explained by the mediator (Hair *et al*., 2010).

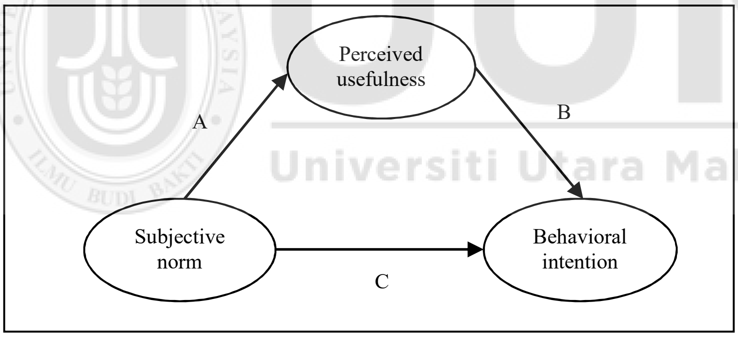


Figure 3.1. Diagram showing mediation effect

The initial step in assessing the mediation effect is to estimate the direct effect of exogenous variable towards endogenous variable (path C). Then, include the mediating variable in the model and estimate the effects of two additional paths (A and B). If the relationship between SN and BI (path C) remains significant and unchanged when the mediator PU is included in the model, it is concluded that mediation is not supported. If the effect value in path C is reduced but remains significant, the mediation effect is called as partial mediation; but, if path C effect value is reduced to a point that is not statistically significant, then full mediation has occurred (Hair *et al*., 2010; Little, Card, Bovaird, Preacher, & Crandall, 2007).

3.8.5.5 Examining Moderation Effect

The last step in data analysis is to examine the influence of moderators as to whether the moderator variable changes the relationship between two related constructs (Hair *et al*., 2010). Figure 3.2 shows the relationship path between the variable PU and BI with the variable gender as its moderator. A hypothesis involving moderator can be tested using multiple-group analysis in which similar models are estimated for different groups of respondents (i.e. gender).

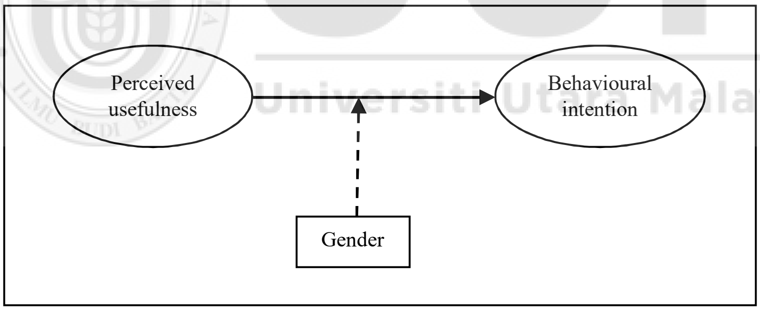


Figure 3.2. Diagram showing moderator effect

To begin with, the data is split into two groups according to the moderator variable being tested (i.e. female and male). Next, construct two separate structural models (model 1 and model 2) involving the variables (i.e. PU and BI) and identify the path of interest where the effect of moderator variable is to be assessed. Model 1 is an unconstrained model in which the researcher conducts path estimates calculation separately for each group (i.e. female and male) whereas model 2 is a constrained model as the path estimates of interest is constrained to be equal between the groups. Both models are estimated to obtain their model fit indices (i.e. CFI and RMSEA). Then, the chi-square difference ($\Delta\chi^2$) between unconstrained model and constrained model is calculated to determine whether the moderator variable has a significant moderation effect on the relationship between the constructs. Moderation exists if there is a statistically significant difference between models which means the model fit is significantly better when separate path estimates are made. However, moderation does not occur if the models are not significantly different that is the path estimates are not different between groups. In other words, testing the moderator requires the researcher to observe significant differences in the path estimates of the two models to support the hypothesis (Hair *et al*., 2010, pp.771-772).

3.9 Chapter Summary

This study intended to examine the determinants that influence the English language lecturers in UiTM to adopt mobile technology in their teaching practices. The result of the study is beneficial to the educators and institution in developing strategies towards integrating the usage of mobile technology in teaching and learning activities. Questionnaire developed based on TAM literature were distributed to the selected samples of UiTM English language lecturers from the state campuses. Statistical analysis using AMOS procedure was used to test the hypotheses presented in this study and to fulfill the objectives of the research.

CHAPTER FOUR
FINDINGS

4.1 Introduction

This chapter presents the data analysis and findings of the survey which cover three major parts; (1) preliminary analysis that describes outliers analysis, descriptive analysis, common method bias and exploratory factor analysis using Statistical Package for Social Science (SPSS) version 20.0; (2) measurement model assessment which includes Confirmatory Factor Analysis (CFA), normality, reliability, validity and model fit using Analysis of Moment Structures (AMOS) software version 20.0; and (3) structural model assessment that consists of research hypothesis analysis including mediation and moderation effects of the variables.

4.2 Preliminary Analysis

The process of data collection was done after the pilot test was undertaken which analysed the reliability of the construct, confirming on content validity and checking for errors in the questionnaire. A total of 589 questionnaires were distributed to the sample of English language lecturers in UiTM campuses through the Head of Department of Academy of Language Studies. Responses collected were 337 questionnaires which comprised of 57.2 percent of response rate.

Once the questionnaires were collected, data entry was conducted using the identified data coding into SPSS software version 20.0. Missing data and data entry errors were detected, revised and fixed before further analysis was performed. All respondents answered more than 75 percent of the questionnaire which fulfilled the requirement of being included in the research analysis (Sekaran & Bougie, 2013).

4.2.1 Outliers Analysis

The analysis on outliers was done as to identify cases with scores that were substantially different from all the other set of data (Byrne, 2010). Using SPSS version 20.0, the boxplot analysis was conducted and some extreme points were found to occur for certain variables (i.e. education level; refer Appendix D). Further inspection on the extreme points across all variables revealed that these observations were still acceptable and did not stem from the respondents' response errors. On top of that, Gaskin (2016) asserted that outliers do not occur for questionnaire that adopts Likert-scales items because respondents who answer questions with an extreme scale of 1 or 5 do not represent outlier behaviour. Therefore, it was decided that no outliers existed in the dataset and all cases were retained for further analysis.

4.2.2 Descriptive Analysis

Section A of the questionnaire requires the respondents to answer several questions related to their demographic background including gender, age, and work information. Table 4.1 presents the descriptive analysis on the demographic profile.

The total number of respondent was 337 individuals which comprised of 59 male (17.5%) and 278 female (82.5%). Analysis on age showed that most of the respondents belonged to the age group of less than 29 years (29.7%) and 40 to 49 years old (27.9%). Majority of the respondents had the qualification of master degree (85.2%) while bachelor degree and doctoral level only consisted of 7.7 percent and 7.1 percent respectively. Malay lecturers represented 82.5 percent of the respondents' race, Chinese (6.2%), other races (5.9%) and Indians with only 5.3 percent.

As for job title, the respondents consisted of lecturers with DM45/46 position (59.3%), senior lecturers (26.1%), contract lecturer (11.9%) and the least was Associate Professor position (2.7%). Analysis on income showed that most of the respondents earned more than RM6001 per month (27.9%), followed by RM4001 to RM5000 (23.4%), RM3001 to RM4000 (19.6%), RM5001 to RM6000 (14.8%) while earnings of less than RM2000 and RM2001 to RM3000 had the same value of 7.1 percent. Most of the respondents (35%) have been working in UiTM for less than 5 years while the least respondents (8.6%) have worked for 16 to 20 years. As for state campuses, the highest percentage came from the respondents of Perak campus (13.1%) followed by Melaka (11.6%) and Johor (11.0%) while Pulau Pinang and Sabah consisted of only 3.9 percent and 3.6 percent respectively. Finally, almost half of the respondents (48.7%) had a teaching workload of 17 to 20 hours per week while only 8 respondents (2.4%) taught less than 8 hours.

Table 4.1

Respondents' demographic profile

Characteristic	Group	Cases	Percentage (%)
Gender	1) Male	59	17.5
	2) Female	278	82.5
Age	1) Below 29 years	100	29.7
	2) 30 – 39 years	87	25.8
	3) 40 – 49 years	94	27.9
	4) Above 50 years	56	16.6
Education level	1) Bachelor Degree	26	7.7
	2) Master Degree	287	85.2
	3) Doctoral Level	24	7.1
Race	1) Malay	278	82.5
	2) Chinese	21	6.2
	3) Indian	18	5.3
	4) Others	20	5.9
Job title	1) Associate Professor (DM53/54)	9	2.7
	2) Senior Lecturer (DM51/52)	88	26.1
	3) Lecturer (DM45/46)	200	59.3
	4) Contract Lecturer	40	11.9
Monthly income	1) Less than RM2000	24	7.1
	2) RM2001 – RM3000	24	7.1
	3) RM3001 – RM4000	66	19.6
	4) RM4001 – RM5000	79	23.4
	5) RM5001 – RM6000	50	14.8
	6) More than RM6001	94	27.9
Working years	1) Less than 5 years	118	35.0
	2) 6 – 10 years	95	28.2
	3) 11 – 15 years	63	18.7
	4) 16 – 20 years	29	8.6
	5) More than 20 years	32	9.5
State campus	1) Johor	37	11.0
	2) Kedah	22	6.5
	3) Kelantan	31	9.2
	4) Melaka	39	11.6
	5) Negeri Sembilan	23	6.8
	6) Pahang	29	8.6
	7) Perak	44	13.1
	8) Perlis	17	5.0
	9) Pulau Pinang	13	3.9
	10) Sabah	12	3.6
	11) Sarawak	30	8.9
	12) Selangor	17	5.0
	13) Terengganu	23	6.8

Teaching hours	1) Less than 8 hours	8	2.4
	2) 9 – 12 hours	12	3.6
	3) 13 – 16 hours	56	16.6
	4) 17 – 20 hours	164	48.7
	5) More than 20 hours	97	28.8

Further analysis was also done to investigate the respondent's usage and experience of mobile technology devices as shown in Table 4.2. The analysis on the type of mobile technology devices the English language lecturers in UiTM own showed that 111 respondents currently possess cell or mobile phone, 304 respondents have smart phone, 103 lecturers own a tablet, only 4 individuals have PDA, 277 respondents possess laptop or notebook and 48 lecturers have an MP3 player. In terms of experience in using mobile technology devices, majority of the respondents had used mobile phones (61.7%), smart phones (42.1%) and laptop or notebook (85.8%) for more than 6 years. In contrast, most of the respondents had no experience of using a tablet (59.1%), PDA (93.8%) and MP3 player (71.8%). The analysis on the amount of time spent per day using mobile technology devices showed that majority spent less than an hour for conversations through phone calls (40.4%) and sending text messages (34.7%). In addition, most of the respondents spent 3 to 6 hours per day to browse the internet by accessing the web or email (28.8%) and to use learning or educational materials (31.8%). However, majority of the respondents did not use the mobile technology devices to play games or listen to music (49.3%). Finally, the analysis showed that from the total number of 337 respondents, 241 lecturers (71.5%) had never attended training courses on mobile technology devices whereas 268 of them (79.5%) had used phones for educational purposes.

Table 4.2

Respondents' mobile technology usage and experience

Description	Category	Cases	Percentage (%)
Type of mobile technology device	1) Cell/mobile phone	111	32.9
	2) Smart phone	304	90.2
	3) Tablet	103	30.6
	4) PDA	4	1.2
	5) Laptop/notebook	277	82.2
	6) MP3 player	48	14.2
	7) Others	4	1.2
Experience using cell/mobile phone	1) N/A	95	28.2
	2) < 1 year	5	1.5
	3) 1 – 3 years	10	3.0
	4) 3 – 6 years	19	5.6
	5) > 6 years	208	61.7
Experience using smart phone	1) N/A	37	11.0
	2) < 1 year	19	5.6
	3) 1 – 3 years	43	12.8
	4) 3 – 6 years	96	28.5
	5) > 6 years	142	42.1
Experience using tablet	1) N/A	199	59.1
	2) < 1 year	20	5.9
	3) 1 – 3 years	24	7.1
	4) 3 – 6 years	59	17.5
	5) > 6 years	35	10.4
Experience using PDA	1) N/A	316	93.8
	2) < 1 year	3	0.9
	3) 1 – 3 years	6	1.8
	4) 3 – 6 years	2	0.6
	5) > 6 years	10	3.0
Experience using laptop/notebook	1) N/A	23	6.8
	2) < 1 year	2	0.6
	3) 1 – 3 years	1	0.3
	4) 3 – 6 years	22	6.5
	5) > 6 years	289	85.8
Experience using MP3	1) N/A	242	71.8
	2) < 1 year	7	2.1
	3) 1 – 3 years	13	3.9
	4) 3 – 6 years	13	3.9
	5) > 6 years	62	18.4
Time spent on conversation	1) N/A	47	13.9
	2) < 1 hour	136	40.4
	3) 1 – 3 hours	69	20.5

	4) 3 – 6 hours	33	9.8
	5) > 6 hours	52	15.4
Time spent on messaging	1) N/A	29	8.6
	2) < 1 hour	117	34.7
	3) 1 – 3 hours	74	22.0
	4) 3 – 6 hours	46	13.6
	5) > 6 hours	71	21.1
Time spent on internet (web/email)	1) N/A	30	8.9
	2) < 1 hour	52	15.4
	3) 1 – 3 hours	96	28.5
	4) 3 – 6 hours	71	21.1
	5) > 6 hours	88	26.1
Time spent on games/music	1) N/A	166	49.2
	2) < 1 hour	94	27.9
	3) 1 – 3 hours	30	8.9
	4) 3 – 6 hours	13	3.9
	5) > 6 hours	34	10.1
Time spent on learning/educational	1) N/A	30	8.8
	2) < 1 hour	76	22.6
	3) 1 – 3 hours	107	31.8
	4) 3 – 6 hours	83	24.6
	5) > 6 hours	41	12.2
Attended training on mobile technology devices	1) Yes	96	28.5
	2) No	241	71.5
Using phone for educational Purposes	1) Yes	268	79.5
	2) No	69	20.5

4.2.3 Common Method Bias

The data for this research was acquired through a set of questionnaire using a self-reported procedure by the English language lecturers in UiTM state campuses during the same period of time. Since the respondent providing the measures for both exogenous and endogenous variables is basically the same person, the problem of common method variance which refers to the instigation of systematic measurement error that could produce biasness on the estimates of the relationship between constructs may occur (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Even though the review by Malhotra, Kim, and Patil (2006) found that common method biases in the area of Information System are considered relatively small, investigation on its measurement error should still be conducted.

One of the techniques to determine the degree of biases is the Harman single factor test which uses exploratory factor analysis approach by loading all variables into one single factor and examining its unrotated factor solution (Podsakoff *et al*., 2003). Common method bias is considered present if the value of the common latent factor exceeds more than 50 percent of the variance (Eichhorn, 2014). This study then applied the Harman single factor test and the total variance extracted when all items are constrained to one factor was 43.559 percent (refer Appendix F), which was less than the suggested value of 50 percent. Therefore, the collected data were free from the threats of common method bias.

4.2.4 Exploratory Factor Analysis

The framework of this study incorporated seven variables which consisted of five exogenous variables (PU, PE, SN, SE & ME), one endogenous variable (BI) and one moderator variable (UC). The exogenous and endogenous variables were all adopted from Technology Acceptance Model (TAM) that has been widely used and verified to investigate user's intention to embrace technology. However, the items for the moderator variable UC were newly constructed based on literature; therefore, factor analysis was executed using SPSS version 20.0 to explain the pattern of correlations within a set of observed variable (Mohd Rafi, 2011).

Referring to Table 4.3, the value for Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.927 which exceeded the value 0.6 (Mohd Rafi, 2011) and this fulfilled the adequacy of sample requirement. In addition, the result showed that the Bartlett's Test of Sphericity was significant ($P<0.05$) which indicated the data were suitable for factor analysis procedure. Further analysis in Table 4.4 showed the values for communality which was the estimate of its variance among the variables as represented by the factors (Hair *et al*., 2010). Communality value of more than 0.5 (Hair *et al*., 2010) indicates that the variable has a lot of common with other variables taken as a group whereas lower value of communality (i.e. variables UC3 & UC4) means that the variable should be removed. Further analysis to confirm on the rejection of these items is presented in Confirmatory Factor Analysis (CFA) section.

Table 4.3

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	15311.424
	df	990
	Sig.	.000

Table 4.4

Communalities

Item	**Initial**	**Extraction**
UC1	1.000	.651
UC2	1.000	.580
UC3	1.000	.497
UC4	1.000	.487
UC5	1.000	.747
UC6	1.000	.814
UC7	1.000	.843
UC8	1.000	.598
UC9	1.000	.643
BI1	1.000	.838

BI2	1.000	.846
BI3	1.000	.872
BI4	1.000	.857
BI5	1.000	.859
PU1	1.000	.840
PU2	1.000	.865
PU3	1.000	.892
PU4	1.000	.884
PU5	1.000	.804
PE1	1.000	.754
PE2	1.000	.828
PE3	1.000	.861
PE4	1.000	.862
PE5	1.000	.689
PE6	1.000	.826
SN1	1.000	.809
SN2	1.000	.850
SN3	1.000	.763
SN4	1.000	.853
SN5	1.000	.721
SN6	1.000	.688
SE1	1.000	.608
SE2	1.000	.667
SE3	1.000	.828
SE4	1.000	.844
SE5	1.000	.646
SE6	1.000	.716
SE7	1.000	.578
ME1	1.000	.797
ME2	1.000	.732
ME3	1.000	.718
ME4	1.000	.755
ME5	1.000	.562
ME6	1.000	.757
ME7	1.000	.718

Table 4.5 displays the total variance explained for all variables of the study. Initial result showed that eight factors were expected to be extracted since their eigenvalues were greater than 1 which meant 75.22 percent of the variance was explained by the behavioural intention variable.

Table 4.5

Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.624	36.942	36.942	16.624	36.942	36.942	8.845	19.656	19.656
2	4.108	9.130	46.072	4.108	9.130	46.072	4.962	11.028	30.683
3	3.800	8.444	54.516	3.800	8.444	54.516	4.623	10.273	40.956
4	3.036	6.747	61.263	3.036	6.747	61.263	4.461	9.914	50.870
5	2.267	5.038	66.301	2.267	5.038	66.301	3.838	8.529	59.399
6	1.702	3.783	70.083	1.702	3.783	70.083	3.756	8.346	67.746
7	1.267	2.815	72.898	1.267	2.815	72.898	2.087	4.638	72.384
8	1.045	2.321	75.220	1.045	2.321	75.220	1.276	2.836	75.220
9	.877	1.948	77.168						
10	.764	1.699	78.867						
11	.750	1.666	80.532						
12	.666	1.481	82.013						
13	.608	1.352	83.365						
14	.588	1.306	84.671						
15	.533	1.184	85.855						
16	.509	1.131	86.985						
17	.455	1.012	87.997						
18	.427	.949	88.946						
19	.403	.896	89.842						
20	.385	.856	90.698						
21	.372	.826	91.525						
22	.338	.750	92.275						
23	.305	.678	92.953						
24	.288	.639	93.591						
25	.267	.594	94.185						
26	.254	.564	94.749						
27	.243	.541	95.290						
28	.212	.471	95.761						
29	.205	.454	96.215						
30	.202	.449	96.665						
31	.171	.381	97.046						
32	.162	.359	97.405						
33	.149	.331	97.736						
34	.135	.301	98.037						
35	.122	.271	98.308						
36	.115	.256	98.565						
37	.106	.235	98.799						
38	.094	.208	99.007						
39	.088	.195	99.202						
40	.085	.189	99.391						
41	.067	.149	99.540						
42	.061	.136	99.676						
43	.053	.117	99.794						
44	.048	.106	99.899						
45	.045	.101	100.000						

Extraction Method: Principal Component Analysis

Further examination was conducted using the rotated component matrix (refer Table 4.6) for all variables of the study which showed the patterns of significant factor loadings for each variable. It was found that each variable had a significant loading (above 0.4) on only one factor except for variables PE1 and SE6 which cross-loaded on two factors (PE1 – factors 1 & 3; SE6 – factors 6 & 8). The decision to keep or delete these variables was decided in Confirmatory Factor Analysis (CFA) procedure.

Table 4.6

Rotated component matrix

	Component							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
UC1							.759	
UC2							.701	
UC3							.633	
UC4							.456	
UC5					.809			
UC6					.871			
UC7					.897			
UC8					.680			
UC9					.714			
BI1	.843							
BI2	.852							
BI3	.860							
BI4	.858							
BI5	.861							
PU1	.824							
PU2	.831							
PU3	.845							
PU4	.848							
PU5	.772							
PE1	.412		.688					
PE2			.778					
PE3			.794					
PE4			.790					
PE5			.758					
PE6			.796					
SN1				.823				
SN2				.850				
SN3				.732				
SN4				.820				
SN5				.756				
SN6				.667				
SE1								.426
SE2						.753		
SE3						.878		
SE4						.899		
SE5						.748		
SE6						.441		.649
SE7						.620		
ME1		.821						
ME2		.786						
ME3		.742						
ME4		.810						
ME5		.617						
ME6		.812						
ME7		.720						

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 7 iterations

4.3 Measurement Model Assessment

The second part of analysis is measurement model assessment which includes Confirmatory Factor Analysis (CFA), normality, reliability, validity and model fit using Analysis of Moment Structures (AMOS) software version 20.0.

4.3.1 Confirmatory Factor Analysis

This study incorporated seven variables or constructs in its research framework which included SE, SN and ME as the exogenous variables, PU and PE as mediator variables and BI as its endogenous variable. In addition, a new variable namely University Culture (UC) was developed to be used as a moderator variable of the study. As suggested by Hair *et al*. (2010), confirmatory factor analysis (CFA) is performed to show how measured variables come together to represent constructs and to assess the model's goodness of-fit (GOF), normality, reliability and validity before further assessment on the hypothesized relationships could be conducted. Following to this, CFA is executed in two parts: (1) each construct is specified into a congeneric measurement model (Hair *et al*., 2010) to assess its unidimensionality which includes the statistical significance of parameter estimates and overall fit (Byrne, 2010); (2) all constructs of the research framework are assessed in full measurement model to obtain its model fit.

A congeneric measurement model hypothesizes no covariance within construct error variance and a sufficiently constrained model should meet the requirement of having construct validity (Hair *et al*., 2010). Table 4.7 presents the list of items for each construct while the CFA results for the specific variables are presented in the following section.

Table 4.7

List of constructs and items

Construct	Item	Label
Behavioural intention (BI)	I intend to use mobile phone in my teaching practices.	BI1
	I predict I would use mobile phone in my teaching practices.	BI2
	I plan to use mobile phone in my teaching practices.	BI3
	I would enjoy using mobile phone for teaching purposes.	BI4
	I would recommend others to use mobile phone for teaching purposes.	BI5
Perceived usefulness (PU)	Using mobile phone would likely improve my teaching performance.	PU1
	Using mobile phone would likely increase my teaching productivity.	PU2
	Using mobile phone would likely enhance the effectiveness of my teaching practices.	PU3
	Using mobile phone would likely be useful in my teaching practices.	PU4
	Using mobile phone would likely enable me to accomplish teaching tasks more quickly.	PU5
Perceived ease of use (PE)	I would likely find my interaction with mobile phone to be clear and understandable.	PE1
	I would likely find mobile phone easy to use.	PE2
	I would likely find it easy to get mobile phone to do what I want it to do.	PE3
	I would likely find mobile phone flexible to interact with.	PE4
	I would likely find my interaction with mobile phone does not require a lot of my mental effort.	PE5
	I would likely find it easy for me to be skillful at using mobile phone.	PE6
Subjective norm (SN)	People who influence my behaviour think that I should use mobile phone in my teaching practices.	SN1
	People who are important to me think that I should use mobile phone in my teaching practices.	SN2
	My students think that I should use mobile phone in my teaching practices.	SN3
	My peers think that I should use mobile phone in my teaching practices.	SN4
	The lecturers in my faculty have been helpful in the use of mobile phone in my teaching practices.	SN5
	In general, the organization has supported the use of mobile phone in my teaching practices.	SN6
Self-efficacy (SE)	I could complete a task using mobile phone if no one is around to tell me how to use it.	SE1
	I could complete a task using mobile phone if I could call someone for help if I got stuck.	SE2
	I could complete a task using mobile phone if someone shows me how to do it first.	SE3
	I could complete a task using mobile phone if someone helps me to get started.	SE4
	I could complete a task using mobile phone if I have a lot of time to do it.	SE5
	I could complete a task using mobile phone if I have never used a product like it before.	SE6

	I could complete a task using mobile phone if I have the built-in help facility for assistance.	SE7
Prior mobile technology experience (ME)	I am able to access information on the internet using mobile phone.	ME1
	I am able to send and read emails using mobile phone.	ME2
	I am able to send and receive Short Messaging System (SMS).	ME3
	I am able to send and receive Multimedia Messaging System (MMS).	ME4
	I am able to use mobile phone to play games.	ME5
	I am able to use mobile phone for social networking activities.	ME6
	I am able to write notes using mobile phone application.	ME7
University culture (UC)	UiTM is a highly reputable teaching university.	UC1
	UiTM plans to be a research university in the future.	UC2
	UiTM lecturers need to fulfill the teaching hours of 16 to 18 hours a week.	UC3
	UiTM lecturers need to teach using various approaches (i.e. face-to-face, e-learning, blended learning, mobile learning).	UC4
	UiTM lecturers need to obtain grants and conduct research.	UC5
	UiTM lecturers need to produce publications of professional reports (i.e. journal articles).	UC6
	UiTM lecturers need to present papers in conferences.	UC7
	UiTM lecturers need to perform professional service duties to the faculty and/or university (i.e. administration and committee work).	UC8
	UiTM lecturers need to perform professional service duties to the community (i.e. consultancy and community activities).	UC9

4.3.1.1 Behavioural Intention (BI)

The indicators for the BI construct were adapted from previous research (Akour, 2009; Wang, Wu, & Wang, 2009) and measured using five questionnaire items as presented in Table 4.7 above. As illustrated in Figure 4.1, the standardized factor loadings (BI1-0.92, BI2-0.92, BI3-0.96, BI4-0.93 & BI5-0.92) were all higher than the recommended level of 0.6 and the standardized parameter estimates were all significant ($p<0.05$).

Figure 4.1. Congeneric measures for behavioural intention

4.3.1.2 Perceived Usefulness (PU)

PU construct was measured using five questionnaire items adapted from previous research (Akour, 2009; Wang, Wu, & Wang, 2009). Figure 4.2 displays high values (above 0.6) of the standardized factor loadings (PU1-0.94, PU2-0.96, PU3-0.98, PU4-0.94 & PU5-0.89) and significant standardized parameter estimates ($p<0.05$).

Figure 4.2. Congeneric measures for perceived usefulness

4.3.1.3 Perceived Ease of Use (PE)

The indicators for PE construct consisted of six questionnaire items which were adapted from similar sources for the PU construct (Akour, 2009; Venkatesh & Davis, 2000; Wang, Wu, & Wang, 2009). Figure 4.3 displays that the standardized factor loadings were all higher than the recommended level of 0.6 (PE1-0.82, PE2-0.89, PE3-0.93, PE4-0.94, PE5-0.72 & PE6-0.86) and the standardized parameter estimates were all significant ($p<0.05$).

Figure 4.3. Congeneric measures for perceived ease of use

4.3.1.4 Subjective Norm (SN)

SN construct was measured using six questionnaire items adapted from several research (Napaporn, 2007; Venkatesh *et al*., 2003; Wang, Wu, & Wang, 2009). As presented in Figure 4.4, all items produced high values (above 0.6) of the standardized factor loadings (SN1-0.90, SN2-0.93, SN3-0.81, SN4-0.88, SN5-0.76 & SN6-0.7) with significant standardized parameter estimates ($p<0.05$).

Figure 4.4. Congeneric measures for subjective norm

4.3.1.5 Self-efficacy (SE)

The construct SE was represented by seven questionnaire items which were adapted from Theng (2009), Venkatesh *et al*. (2003), and Venkatesh (2000). It should be noted in Figure 4.5 that three items had lower than 0.60 values for the standardized factor loadings (SE1-0.26, SE6-0.48 & SE7-0.56) even though the items showed significant standardized parameter estimates (p<0.05). Further analysis in CFA using full measurement model was utilized to help decide whether to retain or delete these items with low standardized factor loadings.

Figure 4.5. Congeneric measures for self-efficacy

4.3.1.6 Prior Mobile Technology Experience (ME)

The indicators for ME construct consisted of seven questionnaire items which were adapted from Reinders (2010) and Theng (2009). Figure 4.6 presents the standardized factor loadings for ME indicators with all items fulfilling the recommended level of 0.6 except item ME5 even though the standardized parameter estimates were all significant (p<0.05). As such, the item (ME5) was deleted when the CFA for full measurement model was executed.

Figure 4.6. Congeneric measures for prior mobile technology experience

4.3.1.7 University Culture (UC)

This study also developed another construct namely university culture (UC) which was used as a moderator variable in the research framework as suggested by previous research (Lee, Kozar, & Larsen, 2003; Marangunić & Granic, 2015; Zakour, 2004) since culture was found to have an effect on a person's behavior and habitual practices. As discussed in Chapter 2, the nine indicators for UC construct were newly developed based on the literature of a lecturer's workload (Kamaruzaman & Siti Akmar, 2009; Ruhil Hayati *et al*., 2006) which was then adjusted according to the culture of UiTM.

Referring to Figure 4.7, four items for the UC construct showed low values (less than 0.60) of standardized factor loadings (UC1-0.34, UC2-0.39, UC3-0.40 & UC4-0.47) even though their critical ratio values were more than 1.645 (refer Table 4.8) which signified significant standardized parameter estimates ($p<0.05$). Since this construct was a moderator variable, it was not included in the CFA procedure for full measurement model assessment. Thus, further analysis towards this construct was implemented in order to identify the relevant indicators and to fulfill its model fit requirement before it could be used in moderator analysis.

Figure 4.7. Congeneric measures for university culture

Table 4.8

Regression weights for university culture construct

	Estimate	**S.E.**	**C.R.**
UC1 ← Univ_Culture	1.000		
UC2 ← Univ_Culture	.972	.197	4.927**
UC3 ← Univ_Culture	1.705	.343	4.972**
UC4 ← Univ_Culture	1.101	.206	5.346**
UC5 ← Univ_Culture	2.441	.396	6.161**
UC6 ← Univ_Culture	2.421	.386	6.266**
UC7 ← Univ_Culture	2.433	.389	6.255**
UC8 ← Univ_Culture	1.775	.304	5.835**
UC9 ← Univ_Culture	1.661	.280	5.939**

Note: ** $p<0.05$

Since the four items (UC1, UC2, UC3 & UC4) had low factor loadings, these four items were removed from congeneric measurement model and the modification indices were re-specified in order to obtain the model fit requirements. As shown in Figure 4.8, the UC construct was left with five items (UC5, UC6, UC7, UC8 & UC9) with standardized factor loadings of more than 0.60 and the measurement model achieved its model fit requirement. As such, for the moderator analysis purpose, the UC construct was based on these five items only.

Figure 4.8. Measurement model fit for university culture

4.3.1.8 Full Measurement Model

Having done the congeneric measures for all the constructs, the CFA for full measurement model was conducted which incorporated all the constructs as depicted in the research framework (refer Figure 2.16). The two-headed arrows are used to correlate the estimates among the constructs with the purpose to test how well measured variables represent a smaller number of constructs (Hair *et al*., 2010). The CFA was performed to assess the normality, reliability, validity and model overall fit using pooled measurement model.

Figure 4.9 depicts the initial measurement model that comprised of six variables (PU, PE, SN, SE, ME & BI) with all corresponding items, which included 36 observed variables and 42 unobserved variables. Meanwhile, Table 4.9 presents the standardized factor loadings estimates for each of the constructs. As suggested by Hair *et al*. (2010), factor loadings should be at least 0.50 and ideally 0.70 in order to confirm that the indicators are strongly related to the associated constructs. Considering the value of 0.60 as the cut-off point for factor loading estimate, the

CFA results showed that standardized factor loadings for all items were above 0.60 except for items SE1 (0.277), SE6 (0.493), SE7(0.568) and ME5 (0.580) which suggested suitable item deletion candidate for the model.

Figure 4.9. Measurement model before modification

Table 4.9

Standardized regression weights for measurement model

			Estimate				**Estimate**
BI5	←	BI	.926	SN4	←	SN	.903
BI4	←	BI	.938	SN3	←	SN	.832
BI3	←	BI	.955	SN2	←	SN	.907
BI2	←	BI	.924	SN1	←	SN	.883
BI1	←	BI	.921	SE1	←	SE	.277
PE6	←	PE	.861	SE2	←	SE	.725
PE5	←	PE	.714	SE3	←	SE	.932
PE4	←	PE	.936	SE4	←	SE	.926
PE3	←	PE	.931	SE5	←	SE	.677
PE2	←	PE	.895	SE6	←	SE	.493
PE1	←	PE	.828	SE7	←	SE	.568
PU1	←	PU	.934	ME1	←	ME	.889
PU2	←	PU	.958	ME2	←	ME	.823
PU3	←	PU	.975	ME3	←	ME	.718
PU4	←	PU	.945	ME4	←	ME	.828
PU5	←	PU	.892	ME5	←	ME	.580
SN6	←	SN	.721	ME6	←	ME	.813
SN5	←	SN	.772	ME7	←	ME	.743

Further analysis using the CFA procedure was conducted by deleting the four items which had less than 0.60 factor loadings (SE1, SE6, SE7 & ME5). Modification indices were also inspected and covariances with high values were correlated to further improve the fit indices of the model. The high values indicated that the respective items (i.e. SN1 & SN2) were redundant and resulted into the highly correlated measurement errors. This may be due to the reason that these items appeared to be written in similar sentence structure but having different contextual representation. As such, the measurement model was modified by freeing the corresponding path to be estimated as shown in Figure 4.10. The modified measurement model produced items with acceptable level of standardized factor loadings (more than 0.60) and model fit was also achieved.

Figure 4.10. Measurement model after modification

4.3.2 Model Fit

The first thing that a study needs to accomplish with the CFA results is the output related to goodness-of-fit. Hair *et al*. (2010) asserted that the goodness-of-fit of the model is indicated by how well it reproduces the observed covariance matrix among the indicator items which is divided into the categories of Chi-square measures (chi-square, degree of freedom and probability), absolute fit measures (Goodness-of-Fit

Index (GFI) and Root Mean Square Error of Approximation (RMSEA)), incremental fit measures (Normed Fit Index (NFI) and Comparative Fit Index (CFI)), and parsimony fit measures (Adjusted Goodness-of-Fit index (AGFI) and Parsimony Normed Fit Index (PNFI)). For reporting purposes, Hair *et al*. (2010) suggested on stating the Chi-square χ^2 value, the degree of freedom, one absolute fit index (the RMSEA value) and one incremental fit index (the CFI or TLI value). As illustrated in Table 4.10, the χ^2 value = 958.604, df = 443, p-value < 0.05, whereas all of the recorded indices (CMIN (χ^2)/df = 2.164; RMSEA = 0.059; NFI = 0.926, CFI = 0.959; AGFI = 0.823; PNFI = 0.827) surpassed the fit criteria which suggested that the model fitted the data very well.

Table 4.10
Fit indices for measurement model

Fit Index	**Fit Criteria**	**Indices**
Chi Square (χ^2)		958.604
Degrees of freedom (df)		443
P-value (probability)		0.000
Absolute Fit Measures		
CMIN (χ^2)/df	≤ 3.0	2.164
RMSEA	between 0.05 and 0.08	0.059
Incremental Fit Measures		
NFI	≥ 0.9	0.926
CFI	≥ 0.9	0.959
Parsimony Fit Measures		
AGFI	≥ 0.8	0.823
PNFI	≥ 0.5	0.827

4.3.3 Univariate and Multivariate Normality

Using SEM analysis requires the observed data to be normally distributed which involves the procedures to assess univariate normality and multivariate normality. Achieving multivariate normality means that the individual variables are normal in a univariate sense and that their combinations are also normal (Hair *et al*., 2010, p.71). The collected data is considered to fulfill the univariate normality through the assessment of two measures; skewness and kurtosis. According to Kline (2011), the indices for skewness and kurtosis should not exceed the values of 3 and 10 respectively. The result in Table 4.11 shows that skewness values for all variables (BI, PU, PE, SN, SE & ME) fell within the value range of 3 while the values for kurtosis showed that these variables fulfilled the value range of 10. Thus, the univariate normality for the collected data with 337 cases was achieved.

Assessing multivariate normality requires the Mardia's coefficient to be less than p(p+2), where p is the number of observed variables (Raykov & Marcoulides, 2008). Referring to Table 4.11, the AMOS output for Mardia's coefficient was 544.674 while the measurement model of the study had 32 observed variables. The calculation for p(p+2) = 32(32+2) = 1088 which means the Mardia's coefficient value was less than p(p+2) value (544.674 < 1088). Hence, the overall data fulfilled the multivariate normality requirement.

Table 4.11

Assessment of normality

Variable	skew	c.r.	kurtosis	c.r.
ME7	-1.458	-10.927	2.299	8.614
ME6	-1.902	-14.256	5.032	18.856
ME4	-1.596	-11.961	3.029	11.351
ME3	-1.171	-8.779	.528	1.979
ME2	-1.898	-14.224	4.511	16.904
ME1	-1.788	-13.397	4.513	16.913
SE5	-.899	-6.738	.776	2.906
SE4	-.808	-6.057	.262	.982
SE3	-.914	-6.854	.641	2.401
SE2	-.927	-6.949	1.147	4.298
SN1	-.143	-1.068	-.059	-.221
SN2	-.224	-1.681	-.115	-.430
SN3	-.321	-2.403	-.308	-1.153
SN4	-.332	-2.487	-.131	-.493
SN5	-.230	-1.723	.088	.329
SN6	-.156	-1.171	.015	.057
PU5	-.696	-5.215	.374	1.403
PU4	-.773	-5.792	.771	2.890
PU3	-.626	-4.692	.377	1.413
PU2	-.592	-4.437	.227	.849
PU1	-.509	-3.811	.186	.696
PE1	-.512	-3.838	.048	.180
PE2	-.727	-5.448	.593	2.224
PE3	-.628	-4.709	.248	.929
PE4	-.579	-4.337	.404	1.513
PE5	-.596	-4.466	.021	.080
PE6	-.660	-4.947	.507	1.898
BI1	-.788	-5.908	.229	.857
BI2	-.873	-6.542	.673	2.521
BI3	-.803	-6.019	.330	1.235
BI4	-.730	-5.471	.094	.352
BI5	-.661	-4.957	.083	.309
Multivariate			544.674	107.175

4.3.4 Construct Reliability

Construct reliability is defined as the measure of reliability and internal consistency of the measured variables representing a latent construct (Hair *et al*., 2010, p.689) which must be established before assessing construct validity. The assessment of construct reliability requires the Cronbach's alpha value to be higher than 0.70 (Hair *et al*., 2010). As presented in Table 4.12, the Cronbach's alpha values for ME, SE, SN, PE, PU and BI constructs were above 0.70 which fulfilled the requirement of construct reliability.

Table 4.12

Reliability and validity assessments

Item	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
Mobile experience		0.909	0.916	0.646
ME1	0.895			
ME2	0.822			
ME3	0.717			
ME4	0.829			
ME6	0.811			
ME7	0.734			
Self-efficacy		0.887	0.889	0.672
SE2	0.707			
SE3	0.947			
SE4	0.934			
SE5	0.647			
Subjective norm		0.933	0.926	0.677
SN1	0.815			
SN2	0.853			
SN3	0.832			
SN4	0.926			
SN5	0.768			
SN6	0.728			
Perceived ease of use		0.942	0.945	0.742
PE1	0.827			
PE2	0.897			
PE3	0.932			
PE4	0.938			
PE5	0.697			
PE6	0.853			
Perceived usefulness		0.974	0.974	0.881
PU1	0.921			
PU2	0.949			
PU3	0.977			
PU4	0.950			
PU5	0.895			
Behavioural intention		0.971	0.969	0.861
BI1	0.928			
BI2	0.937			
BI3	0.965			
BI4	0.913			
BI5	0.896			

4.3.5 Construct Validity

The CFA analysis also includes the construct validity assessment for the proposed measurement model. As mentioned by Hair *et al*. (2010), construct validity is the extent to which a set of measured items reflects the theoretical latent construct those items are designed to measure (p.708). Using SEM analysis, the CFA procedure assesses convergent validity and discriminant validity.

4.3.5.1 Convergent Validity

Convergent validity refers the extent to which the items or indicators of a specific construct converge or share a high proportion of variance in common (Hair *et al*., 2010) and it is measured through factor loadings, average variance extracted (AVE) and composite reliability (CR). High factor loadings (standardized loading estimates of 0.5 and higher) would indicate high convergent validity whereas an AVE value of 0.5 and higher is a good rule thumb to fulfill convergent validity (Hair *et al*., 2010, p.709). In addition, composite reliability value (greater than 0.60) is also used to assess convergent validity since it produces more precise estimate for reliability than the Cronbach's alpha value (Geldhof, Preacher & Zyphur, 2014). As illustrated in Table 4.12, all factor loadings fulfilled the requirement of having the value above 0.5, the acceptable values of AVE which should be more than 0.5 were also fulfilled, and all the scores for composite reliability were above the value of 0.6. Hence, convergent validity requirement for the observed data was fulfilled.

4.3.5.2 Discriminant Validity

Besides assessing convergent validity, discriminant validity should also be assessed since it is the extent to which a construct is truly distinct from the other constructs (Hair *et al*., 2010). The analysis of discriminant validity was conducted by comparing the AVE values for any two constructs with the square of the correlation estimate between the two constructs; discriminant validity was achieved when the variance-extracted estimates were higher than the squared correlation estimate (Hair *et al*., 2010). In addition, discriminant validity was fulfilled when the square root of AVE was higher than the inter-construct correlation values (Zainudin, 2012). Referring to Table 4.13, the square root of the AVE values was greater than the values in its row and column (i.e. square root of AVE for SN = $\sqrt{0.677}$ = 0.823 which was higher than the other correlation values of 0.599, 0.361, 0.267, 0.480 and 0.600); thus, suggesting the model achieved good discriminant validity.

Table 4.13
Discriminant validity assessment

	CR	AVE	SN	BI	SE	ME	PE	PU
SN	0.926	0.677	**0.823***					
BI	0.969	0.861	0.599	**0.928***				
SE	0.889	0.672	0.361	0.218	**0.820***			
ME	0.916	0.646	0.267	0.441	0.207	**0.804***		
PE	0.945	0.742	0.480	0.600	0.077	0.541	**0.861***	
PU	0.974	0.881	0.600	0.878	0.241	0.475	0.669	**0.939***

Note: *Diagonals (bold) represent the square root of Average Variance Extracted (AVE)

In summary, the CFA for the measurement model was conducted to fulfill the requirements of unidimensionality, normality, reliability, validity and model overall fit. Unidimensonality was achieved through the item-deletion process and model re-specification which led to factor loading values of above 0.60 for all items. Normality of the data was also achieved through the inspection on the values of skewness, kurtosis and Mardia's coefficient. For reliability assessments, internal and construct reliabilities were fulfilled when Cronbach's alpha values exceeded 0.70 and AVE values of more than 0.50. Meanwhile, validity assessments involved convergent validity (AVE values > 0.50), construct validity (factor loading > 0.50) and discriminant validity (variance-extracted values > square correlations). In addition, the measurement model represented a satisfactory model fit requirement through its Goodness-of-fit (GOF) indices as displayed in Table 4.10. Since the results for CFA qualified the measurement properties, the study proceeds to the next stage of SEM analysis which is the structural model assessment.

4.4 Assessing Structural Model

Structural model assessment covers the analysis of the causal structure based on relationship between variables in the research framework. Following the confirmation of the measurement model, the study then evaluated the fit of structural path model using the structure of measurement model together with the correlated error terms. As depicted in Figure 4.11, the structural model incorporated six unobserved factors (BI, PE, PU, ME, SE & SN) together with the respective indicators or items and its correlated error terms.

Figure 4.11. Structural model for hypothesis testing

Referring to Table 4.14, the first part of the structural model examined a total of nine (9) hypothesized relationships. Based on the critical ratio (CR) values, in which 1.96 denotes a 0.05 significance level (Hair *et al*., 2010), the results indicated that seven (7) hypotheses were supported (H1a, H1c, H2a, H2b, H2c, H3 & H4a) while two (2) hypotheses namely H1b and H4b were not supported. In addition, the predictive power of the model was assessed through the value of squared multiple correlations

(R^2) for the endogenous variable BI which showed that the R^2 value was 0.774 (refer Appendix J). Therefore, it means that 77 percent of the variations in the endogenous variable BI were explained by the model.

Table 4.14

Result for hypothesis testing

Hypothesis	Path	Estimate	S.E.	C.R.	P supported
Hypothesis 1					
H1a	SN→PU	.421	.065	6.445**	Yes
H1b	SE→PU	.067	.055	1.224	No
H1c	ME→PU	.185	.060	3.079**	Yes
Hypothesis 2					
H2a	SN→PE	.401	.053	7.509**	Yes
H2b	SE→PE	-.171	.050	-3.437**	Yes
H2c	ME→PE	.450	.049	9.129**	Yes
Hypothesis 3					
H3	PE→PU	.532	.072	7.431**	Yes
Hypothesis 4					
H4a	PU→BI	.917	.053	17.353**	Yes
H4b	PE→BI	.031	.055	0.575	No

Note: **p<0.01

4.4.1 Hypothesis 1 (H1a, H1b and H1c)

Hypothesis 1 which consisted of H1a, H1b and H1c was designed to test the influence of subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) on perceived usefulness (PU) of mobile technology.

H1a: Subjective norm (SN) has a significant influence on perceived usefulness (PU) of mobile technology.

H1b: Self-efficacy (SE) has a significant influence on perceived usefulness (PU) of mobile technology.

H1c: Prior mobile technology experience (ME) has a significant influence on perceived usefulness (PU) of mobile technology.

The result showed that the hypothesized relationships for H1a and H1c were significant but no significant effect was found for H1b. There was a strong relationship between subjective norm and perceived usefulness (CR=6.445; $p<0.01$) which supported H1a, but no significant relationship was found between self-efficacy and perceived usefulness (CR=1.224). Hypothesis H1c was also supported as prior mobile technology experience has a significant relationship with perceived usefulness (CR=3.079; $p<0.01$). As such, subjective norm and prior mobile technology experience have positive relationships with perceived usefulness of mobile technology.

The findings imply that people who are important to the English language lecturers such as students, peers and faculty members influence their beliefs that mobile technology device is a useful tool for teaching practices. In addition, these lecturers who have related hands-on experience perceive that mobile technology devices are useful tools to be used in their teaching practices.

4.4.2 Hypothesis 2 (H2a, H2b and H2c)

The second hypothesis involved H2a, H2b and H2c which were designed to test the influence of subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) on perceived ease of use (PE) of mobile technology.

H2a: Subjective norm (SN) has a significant influence on perceived ease of use (PE) of mobile technology.

H2b: Self-efficacy (SE) has a significant influence on perceived ease of use (PE) of mobile technology.

H2c: Prior mobile technology experience (ME) has a significant influence on perceived ease of use (PE) of mobile technology.

The outcome of the analysis showed that the hypothesized relationships for H2a, H2b and H2c were significant. Subjective norm was found to have significant positive effect on perceived ease of use (CR=7.509; $p<0.01$) which supported H2a, while self-efficacy had significant negative relationship with perceived ease of use (CR=-3.437; $p<0.01$) that supported H2b. In addition, hypothesis H2c was also supported since prior mobile technology experience showed a significant positive relationship with perceived ease of use (CR=9.129; $p<0.01$). In conclusion, subjective norm, self-efficacy and prior mobile technology experience have significant relationships with perceived ease of use of mobile technology.

These findings indicate that the English language lecturers perceive mobile technology devices are easy tools to be used in teaching practices in which their beliefs are influenced by people who are close to them, their own abilities, skills and hands-on experience to use the devices.

4.4.3 Hypothesis 3 (H3)

Hypothesis 3 was developed to test the influence of perceived ease of use (PE) on perceived usefulness (PU) of mobile technology.

H3: Perceived ease of use (PE) has a significant influence on perceived usefulness (PU) of mobile technology.

Based on the findings, a significant value was found on the relationship between perceived ease of use and perceived usefulness (CR=7.431; $p<0.01$) which supported H3. The result indicated that perceived ease of use has a significant influence on perceived usefulness of mobile technology.

4.4.4 Hypothesis 4 (H4a and H4b)

The fourth hypothesis consisted of H4a and H4b which were constructed to test the influence of perceived usefulness (PU) and perceived ease of use (PE) on behavioural intention (BI) of using mobile technology.

H4a: Perceived usefulness (PU) has a significant influence on behavioural intention (BI) of using mobile technology.

H4b: Perceived ease of use (PE) has a significant influence on behavioural intention (BI) of using mobile technology.

The results specified that only H4a had a significant positive relationship with behavioural intention whereas H4b was not significant. There was a strong relationship between perceived usefulness and behavioural intention (CR=17.353;

$p<0.01$) which supported H4a; but no significant relationship was found between perceived ease of use and behavioural intention (CR=0.575). As such, perceived usefulness has a significant influence on behavioural intention of using mobile technology.

The results infer that the English language lecturers have the intention to utilize mobile technology devices in their teaching and learning activities due to the usefulness of the devices. On the other hand, even though mobile technology devices such as mobile phones are considered a part of a person's daily needs, its easy usage does not influence the lecturers to use it in their teaching practices.

4.5 Mediating Analysis

Another section of the analysis involved the investigation of mediating effect between the exogenous variables (ME, SE & SN) and the endogenous variable (BI) through the variables of PE and PU. The evaluation of mediators was conducted through several stages: (1) the direct effect of exogenous variables towards endogenous variable without the mediator is significant; (2) the effect from exogenous variable towards mediator variable is significant; (3) the effect from mediator variable towards endogenous variable is significant; (4) the estimate from exogenous variable towards endogenous variable is reduced when mediator variable is included. Partial mediation occurs when the estimate is reduced and significant while full mediation occurs when estimate is reduced but not significant (Hair *et al*. 2010; Little *et al*., 2007; Zainudin, 2012).

4.5.1 Hypothesis 5 (H5a, H5b and H5c)

Hypotheses H5a, H5b and H5c were developed to investigate the mediating effects of perceived usefulness (PU) on the relationships between subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) towards behavioural intention (BI) of using mobile technology.

H5a: Perceived usefulness (PU) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology.

H5b: Perceived usefulness (PU) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology.

H5c: Perceived usefulness (PU) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology.

From the analysis conducted, subjective norm (SN) was found to have significant direct and indirect effects on behavioural intention (BI) when the mediating variable perceived usefulness (PU) was included in the model. This indicated that PU acted as partial mediator between SN and BI of using mobile technology. As for prior mobile technology experience (ME), the result found that it had significant direct and indirect effects (ME→PU and PU→BI) which proved that PU mediated its relationship. This indicated that PU also partially mediates the relationship between ME and BI of using mobile technology. In contrast, the result showed that SE had no significant direct effect with PU. As a result, PU does not mediate the relationship between SE and BI of using mobile technology. In conclusion, hypotheses H5a, and H5c were supported since PU mediated the relationships of SN and ME with BI whereas hypothesis H5b was not supported.

The result on PU as a mediator for the relationships of SN-BI and ME-BI reflects that the usefulness of mobile technology devices in teaching and learning practices has an influence towards the English language lecturer's efficacy and hands-on experience in their behavioural intention of using the devices.

4.5.2 Hypothesis 6 (H6a, H6b and H6c)

Hypotheses 6 which incorporated H6a, H6b and H6c was developed to examine the mediating effects of perceived ease of use (PE) on the relationships between subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) towards behavioural intention (BI) of using mobile technology.

H6a: Perceived ease of use (PE) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology.

H6b: Perceived ease of use (PE) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology.

H6c: Perceived ease of use (PE) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology.

The analysis showed that one of the indirect effects (PE→BI) had no significant relationship for hypotheses H6a, H6b and H6c. Since one of the conditions for mediating effect to occur is to have significant indirect effects (Hair *et al*., 2010), this resulted into the conclusion that perceived ease of use (PE) was not found to mediate the relationships of SN, SE and ME towards BI of using mobile technology.

The results depict PE is not a mediator for the relationships of SN-BI, SE-BI and ME-BI which means the easiness of using mobile technology devices such as the mobile phones does not influence the intentions of the English language lecturers to use the devices in their teaching practices even though the lecturers may be encouraged to do so by people who are close to them and their own self-abilities or experiences in using the mobile devices. Table 4.15 presents the result on the mediating effects of variables PU and PE.

Table 4.15

Result for mediator effect

Hypothesis	Path	Standardized coefficient (β)	P supported
H5a	SN→BI (without PU as mediator)	0.681**	Yes
	SN→PU	0.537**	Yes
	PU→BI	0.788**	Yes
	SN→BI (indirect effect)	0.420**	Yes
PU partially mediates the relationship between SN and BI of using mobile technology			
H5b	SE→BI (without PU as mediator)	-0.054	No
	SE→PU	-0.033	No
	PU→BI	0.788**	Yes
	SE→BI (indirect effect)	-0.025	No
PU does not mediate the relationship between SE and BI of using mobile technology			
H5c	ME→BI (without PU as mediator)	0.404**	Yes
	ME→PU	0.358**	Yes
	PU→BI	0.788**	Yes
	ME→BI (indirect effect)	0.279**	Yes
PU partially mediates the relationship between ME and BI of using mobile technology			
H6a	SN→BI (without PE as mediator)	0.681**	Yes
	SN→PE	0.448**	Yes
	PE→BI	-0.007	No
	SN→BI (indirect effect)	0.420**	Yes
PE does not mediate the relationship between SN and BI of using mobile technology			
H6b	SE→BI (without PE as mediator)	-0.054	No
	SE→PE	-0.186**	Yes
	PE→BI	-0.007	No
	SE→BI (indirect effect)	-0.025	No
PE does not mediate the relationship between SE and BI of using mobile technology			
H6c	ME→BI (without PE as mediator)	0.404**	Yes
	ME→PE	0.476**	Yes
	PE→BI	-0.007	No
	ME→BI (indirect effect)	0.279**	Yes
PE does not mediate the relationship between SE and BI of using mobile technology			

Note: **p< 0.01

Furthermore, Table 4.16 displays the magnitude of the mediating effects represented by the standardized values of total effects, direct effects and indirect effects. For both hypotheses that proved the existence of mediator, the analysis showed that the standardized value for direct effect was reduced (H5a: from 0.681 to 0.128; H5c: from 0.404 to 0.042).

Table 4.16

Direct and indirect effects of mediation test

Hypothesis	Direct effect (without mediator)	Direct effect (with mediator)	Indirect effect	Total effect
H5a*	0.681	0.128	0.420	0.548
H5b	-0.054	-0.027	-0.025	-0.052
H5c*	0.404	0.042	0.279	0.321
H6a	0.681	0.128	0.420	0.548
H6b	-0.054	-0.027	-0.025	-0.052
H6c	0.404	0.042	0.279	0.321

Note: *partial mediation

4.6 Moderator Analysis

The last section of the analysis examined the effect of moderator variable on the relationship between two variables (PU→BI & PE→BI) to fulfill its research objectives. Using AMOS version 2.0, the evaluation of moderators were conducted through multiple-group analysis by estimating each group of moderator using constrained models and unconstrained models. The initial step in conducting the analysis of moderation effect is to ensure that the causal effect between exogenous variable and endogenous variable is significant (Zainudin, 2012). Subsequently, the analysis obtains the chi-square difference ($\Delta\chi^2$) between the models as to identify significant moderation effect on the relationship between the variables (Hair *et al*., 2010; Nguyen & Aoyama, 2015). If the chi-square difference ($\Delta\chi^2$) between the two models exceeds the critical value of 3.84 (α=0.05) with 1 degree of freedom, then the moderator has a significant moderation effect on the selected relationship (Bolt, 1999; Zainudin, 2012).

As reviewed through literature and theoretical framework, this study identified three types of moderator which were gender, age and university culture. Each moderator was divided into two groups which consisted of male and female for gender; younger and older lecturers for age; and high and low practices of university culture. The initial step in identifying the moderation effect was to estimate without any constraints the path coefficients separately for both groups. In the second step, a constraint was imposed on the identified path for both groups and estimated for its goodness of fit indices. Then, the analysis of chi-square difference ($\Delta\chi^2$) determined whether significant moderation effect existed between the models.

4.6.1 Age as Moderator Variable

Based on the total responses of 337 cases used in testing structural model, the study divided the respondents into two groups: younger lecturers (age below 39 years old; N=187) and older lecturers (age above 40 years old; N=150). The investigation whether age has a moderator influence of PU and PE toward BI was performed by testing two hypotheses below:

H7a: Age moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

H8a: Age moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

In fulfilling the analysis requirement of H7a, the result for unconstrained and constrained models in investigating the different moderation effects of age for the relationship between PU and BI is presented in Table 4.17. For the lecturers' age group, the chi-square difference ($\Delta\chi^2$) between the constrained and unconstrained model was more than 3.84 (1728.172 - 1723.642 = 4.53) which denoted that moderation effect was significant. As such, it can be asserted that age does moderate the relationship between PU and BI of using mobile technology. This denotes the younger group of lecturers' intention to use mobile technology devices is higher than the older group of lecturers since they believe the devices are very useful in their teaching practices.

Table 4.17

Testing age as moderator for PU→BI relationship

	Unconstrained model	**Constrained model**	**Difference**	**Result on moderation**
χ^2	1723.642	1728.172	4.53	Significant
df	892	894	2	
CFI	0.935	0.935		
RMSEA	0.053	0.053		
Standardized estimate (β)	0.924 (younger)* 0.822 (older)*	0.864 (combined)*		

Note: *p < 0.05

The analysis on the moderation effect of age towards PE and BI was not examined since the initial hypothesis on the relationship between PE and BI (H4b) was found to be insignificant.

4.6.2 Gender as Moderator Variable

For gender analysis, the responses from structural model were split into male (N=59) and female (N=278) groups. The hypotheses involved in examining the effect of gender as moderator on the relationships of PU and PE toward BI were as below:

H7b: Gender moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

H8b: Gender moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

The result of H7b on the moderation effects of gender for the relationship between PU and BI is presented in Table 4.18. The analysis showed that the chi-square difference ($\Delta\chi^2$) between constrained and unconstrained model for the lecturers' gender group was less than 3.84 (1775.210 – 1772.648 = 2.562) which implied non-significant moderation effect. This leads to the conclusion that gender does not moderate the relationship between PU and BI of using mobile technology. As such, the usefulness of mobile technology devices in teaching practices provides no difference in the behavioural intention of using these devices between the female and male English language lecturers.

Table 4.18
Testing gender as moderator for PU→BI relationship

	Unconstrained model	**Constrained model**	**Difference**	**Result on moderation**
χ^2	1772.648	1775.210	2.562	Not significant
df	892	894	2	
CFI	0.932	0.932		
RMSEA	0.054	0.054		
Standardized estimate (β)	0.956 (male)* 0.837 (female)*	0.864 (combined)*		

Note: *$p < 0.05$

The analysis on the moderation effect of gender towards PE and BI was not examined because the relationship between PE and BI (H4b) was found to be insignificant.

4.6.3 University Culture as Moderator Variable

Using the total responses of 337 cases, the study separated the respondents into two groups using the median value of UC variables (Im, Kim, & Han, 2008; Nguyen & Aoyama, 2015) which consisted of high practices (N=189) and low practices (N=148) of university culture groups. The effect of UC as moderator on the relationship of PU and PE toward BI was conducted using the hypotheses below:

H7c: University culture moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology.

H8c: University culture moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology.

The analysis of moderation effect for university culture on the relationship between PU and BI is presented in Table 4.19. For the lecturers' group that practiced university culture, the chi-square difference ($\Delta\chi^2$) was 2.924 which was less than 3.84 and this meant that moderation effect was not significant. In conclusion, university culture does not moderate the relationship between PU and BI of using mobile technology. Thus, the working culture of UiTM does not influence the behavioral intention of the English language lecturers to utilize mobile technology devices even though they perceive the devices as useful tools in teaching activities.

Table 4.19

Testing university culture as moderator for PU→BI relationship

	Unconstrained model	Constrained model	Difference	Result on moderation
χ^2	1664.031	1666.955	2.924	Not significant
df	892	894	2	
CFI	0.939	0.938		
RMSEA	0.051	0.051		
Standardized estimate (β)	0.871 (low)* 0.843 (high)*	0.864 (combined)*		

Note: $^*p < 0.05$

Finally, the analysis on the moderation effect of university culture towards PE and BI was not conducted due to the reason that the relationship between PE and BI (H4b) was not significant.

Based on the analyses of moderation effects, the results showed that only age had a moderation effect on the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology (H7a). However, the other two moderators (gender and university culture) had no significant moderation effects for the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology (H7b & H7c). Meanwhile, the moderation effects of age, gender and university culture towards the relationship of perceived ease of use (PE) and behavioural intention (BI) of using mobile technology were excluded from analysis because of its insignificant relationship (H4b).

4.7 Hypotheses Results

The study investigated eight main hypotheses with a total of eighteen (18) hypothesized relationships being tested. Table 4.20 summarizes the results which supported ten of the hypotheses (H1a, H1c, H2a, H2b, H2c, H3, H4a, H5a, H5c, & H7a).

Table 4.20

Summary of hypotheses testing

	Hypothesis statement	Result
H1a	Subjective norm (SN) has a significant influence on perceived usefulness (PU) of mobile technology	Supported
H1b	Self-efficacy (SE) has a significant influence on perceived usefulness (PU) of mobile technology	Not supported
H1c	Prior mobile technology experience (ME) has a significant influence on perceived usefulness (PU) of mobile technology	Supported
H2a	Subjective norm (SN) has a significant influence on perceived ease of use (PE) of mobile technology	Supported
H2b	Self-efficacy (SE) has a significant influence on perceived ease of use (PE) of mobile technology	Supported
H2c	Prior mobile technology experience (ME) has a significant influence on perceived ease of use (PE) of mobile technology	Supported
H3	Perceived ease of use (PE) has a significant influence on perceived usefulness (PU) of mobile technology	Supported
H4a	Perceived usefulness (PU) has a significant influence on behavioural intention (BI) of using mobile technology	Supported
H4b	Perceived ease of use (PE) has a significant influence on behavioural intention (BI) of using mobile technology	Not supported
H5a	Perceived usefulness (PU) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology	Supported
H5b	Perceived usefulness (PU) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology	Not supported
H5c	Perceived usefulness (PU) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology	Supported
H6a	Perceived ease of use (PE) mediates the relationship between subjective norm (SN) and behavioural intention (BI) of using mobile technology	Not supported
H6b	Perceived ease of use (PE) mediates the relationship between self-efficacy (SE) and behavioural intention (BI) of using mobile technology	Not supported
H6c	Perceived ease of use (PE) mediates the relationship between prior mobile technology experience (ME) and behavioural intention (BI) of using mobile technology	Not supported

H7a	Age moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology	Supported
H7b	Gender moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology	Not supported
H7c	University culture moderates the relationship between perceived usefulness (PU) and behavioural intention (BI) of using mobile technology	Not supported
H8a	Age moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology	Could not be examined
H8b	Gender moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology	Could not be examined
H8c	University culture moderates the relationship between perceived ease of use (PE) and behavioural intention (BI) of using mobile technology	Could not be examined

4.8 Chapter Summary

In summary, the chapter explained the findings involving 337 respondents of the English language lecturers in UiTM which included its preliminary analysis (descriptive analysis, outliers, common method bias and exploratory factor analysis), measurement model assessment (Confirmatory Factor Analysis, normality, reliability, validity and model fit) and structural model assessment (hypothesis analysis, mediation and moderation effects) using Statistical Package for Social Science (SPSS) version 20.0 and Analysis of Moment Structures (AMOS) software version 20.0. Eight main hypotheses that described a total of 21 relationships of the research framework were examined in this study. The results found 10 relationships were supported, 8 relationships were not supported whereas 3 hypotheses could not be examined. The next chapter presents the discussions based on the results of the analysis, its implication, limitation and recommendation for future research.

CHAPTER FIVE
DISCUSSIONS AND CONCLUSIONS

5.1 Introduction

The last chapter of this thesis provides the discussions related to the findings of the study by offering possible explanations and justifications for the significant and insignificant relationships as proposed by the research framework based on related theories and previous studies. Specifically, the discussions are presented by fulfilling the objectives of the research. The theoretical and practical implications of the findings, limitations identified from the study, and recommendation areas for future research are also presented.

5.2 Summary of Findings

As described in chapter one, this research identified five main objectives with the aim to investigate eight research hypothesis for twenty-one (21) types of relationships of the proposed research framework. The data analysis for this study concluded that from eighteen (18) hypothesized relationships being tested, only ten hypotheses were supported. For the first objective, the external variables of subjective norm, self-efficacy and prior mobile technology experience had significant influences on perceived ease of use but only self-efficacy had no significant relationship with perceived usefulness. The second objective of the study was fulfilled since the study confirmed the significant relationship between perceived ease of use and perceived usefulness. However, the third objective only significantly verified the relationship between perceived usefulness and behavioural intention. As for the fourth objective, perceived usefulness mediated the relationships of subjective norm and prior mobile technology experience with behavioural intention of using mobile technology device. Finally, the fifth objective discovered that only age acted as a moderator for the relationship between perceived usefulness and behavioural intention.

5.2.1 Discussions on Research Objective One

The first research objective of this study was whether subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) had an influence on perceived usefulness (PU) and perceived ease of use (PE) of mobile technology. Two sets of hypotheses (H1a, H1b, H1c, H2a, H2b & H2c) were developed to investigate the relationships between the identified external variables (SN, SE & ME) with the exogenous variables of PU and PE. All hypotheses were supported except for H1b which denoted that SE did not have a significant influence on PU of mobile technology.

5.2.1.1 Effects of Subjective Norm (SN)

The study investigated the relationships between subjective norm (SN) and two exogenous variables of perceived usefulness (PU) and perceived ease of use (PE). Subjective norm is a person's perception that most people who are important to him/her think he/she should or should not perform the behaviour in question (Fishbein & Ajzen, 1975, p.302). The analysis on mean values (refer Appendix M) for subjective norm construct showed that item SN3 had the highest mean value with 4.68 followed by item SN4 (4.40). This denotes that the UiTM English lecturers tend to use mobile phones in their teaching practices due to the influence of the students and peers. In mobile learning applications focusing on language learning, the students use the mobile phones to access vocabulary, grammar, idioms, reading and phrasal verbs materials which make their learning activities become more personalized, authentic and informal (Bahrani, 2011; Kukulska-Hulme *et al*., 2006). Consequently, the lecturers also need to use the mobile phone to guide and facilitate the students on the language materials (Kukulska-Hulme, 2013) while simultaneously share related knowledge and skills on using mobile technologies with their peers.

The result of this study indicated that subjective norm had a significant influence on perceived usefulness of using technology which supported the positive findings of past literature (Akour, 2009; Conci, Pianesi, & Zancanaro, 2009; Lu & Viehland, 2008; van Biljon & Kotze, 2008). This implies that UiTM English language lecturers' beliefs on the usefulness of mobile technology devices such as the mobile phone in enhancing their teaching practices is influenced by other people who are important to them such as the students, peers, faculty members and even the organization itself. Due to the increase of mobile phone users among students (Supyan *et al*., 2012) and their involvement in mobile learning, the lecturers should consider the possibility of using the functions of mobile technologies in their teaching practices (Kukulska-Hulme, 2013). However, educators would only perceive mobile phone as a useful tool if it provides considerable benefits to student learning or to their own teaching practices (MacCallum, Jeffrey, & Kinshuk, 2014). As such, it is the responsibility of the organization to conduct training sessions to the lecturers so that they are exposed to the innovative pedagogical techniques of using mobile technology in their teaching styles and consequently utilizing it in their work culture (Supyan *et al*., 2012; Traxler & Vosloo, 2014).

Even though subjective norm or social influence was considered a core construct, not many studies investigated its relationship with the main variables of TAM (Venkatesh *et al*., 2003) which supported the view of Holden and Rada (2011) that external constructs have not been examined in depth in existing TAM studies. For this study, subjective norm was found to have a significant relationship with perceived ease of use and this finding was in accordance with TAM studies of mobile learning (Akour, 2009; Lu & Viehland, 2008). The positive relationship means that people who are considered important to these lecturers would influence the beliefs of the UiTM English lecturers that using mobile technologies in their teaching practices would be free of effort. According to Davis (1989), users would have the tendency to accept and use the technology if it is perceived to be easily used which is reflected through the influence of students and peers when the lecturers utilize mobile phones in their teaching activities. On top of that, the concept of mobile teaching and learning is further enhanced through the extraordinary growth of mobile phone users, the wide coverage of cellular connectivity in Malaysia

(Nagrajan, 2012) and the increase of mobile phone usage in education especially in Asia (Motlik, 2008).

5.2.1.2 Effects of Self-Efficacy (SE)

The relationships between the external variable of self-efficacy (SE) and the exogenous variables of perceived usefulness (PU) and perceived ease of use (PE) were also examined. Based on Lee, Kozar and Larsen (2003), this study defined self-efficacy as the English language lecturers' beliefs that they have the capability to use mobile technology devices in their teaching practices. The highest mean values (refer Appendix M) of self-efficacy construct were reflected in items SE7 (5.39) and SE1 (5.32). However, based on the congeneric measures (refer Figure 4.5) and confirmatory factor analyses (refer Figure 4.9), these two items were dropped from the research model since their standardized factor loadings were below 0.60. As such, item SE5 had the highest mean value of 5.36 which means that the English language lecturers in UiTM could complete a task using a mobile phone if they have a lot of time to do it. In other words, having more time could assist the lecturers to be more prepared and confident in using the mobile phones in their teaching practices. Time limitation may be due to the reason since besides teaching, the lecturers have other workloads to fulfill such as writing research papers and performing duties to the faculty and community.

This study found that self-efficacy did not have a significant influence on perceived usefulness of using technology which was in contrast to the findings of past literature on mobile learning and mobile technology (Lu & Viehland, 2008; Songpol, Bruner II, & Neelankavil, 2014). However, it supported the finding by Holden and Rada (2011) who concluded a negative relationship between self-efficacy and perceived usefulness of using computer technologies among teachers. The inconsistent findings might be due to the reason that the influence of self-efficacy differs across the type of technology being used and various sample of respondents (Holden & Rada, 2011). Besides, mobile learning is not formally practiced and implemented in UiTM which may cause the negative relationship for this study. Even though the lecturers considered that they have the abilities and skills to use mobile phones, they still need to believe that using this device would be useful in teaching and learning practices and enhance the effectiveness of their work.

The analysis between self-efficacy and perceived ease of use showed a negative significant relationship which denoted that the lecturers perceive that using mobile phones in their teaching practices requires more effort to use as they need to have the knowledge and confidence based on their experience in using the device. According to Venkatesh (2000), the effect of using a technology becomes stronger with experience; however, the users' perceived ease of use is based on individual differences and situational characteristics. The skills of using mobile phones in teaching practices requires improved knowledge through experience which makes the lecturers perceive the task and technology to be rather challenging before it is considered easy and useful. This means that the lecturers should continuously acquire the knowledge of using mobile technology devices in teaching and learning activities by attending workshops and courses that could assist them to be a technology-enabled instructor. Nevertheless, existing research found positive relationships which included those that studied on the acceptance technology of computer (Holden & Rada, 2011), e-learning (Chen & Tseng, 2012; Mbarek & Zaddem, 2013; Ong & Lai, 2006; Park, 2009), and tablet application (Songpol, Bruner II, & Neelankavil, 2014). As such, this finding on the acceptance of mobile technology devices provides additional literature on the relationship of self-efficacy and perceived ease of use.

5.2.1.3 Effects of Prior Mobile Technology Experience (ME)

The study also examined the associations between prior mobile technology experience (ME) with the variables of perceived usefulness (PU) and perceived ease of use (PE). Prior mobile technology experience is defined in this study as the understanding and knowledge gained by the English language lecturers from using mobile technology devices like mobile phone and smart phone. Referring to the analysis on mean values of prior mobile technology experience construct (refer Appendix M), item ME3 had the highest mean value (6.43) which indicated that the English language lecturers had a high proficiency level of sending and receiving Short Messaging System (SMS). This was followed with the knowledge and experience of using mobile phone for social networking activities, and accessing information on the internet using mobile phone. According to Nagrajan (2012), Malaysians are big adopters of SMS and almost 84 percent of Malaysia has cellular coverage which contributes to the knowledge and exposure of using mobile phone devices. In addition, statistics showed that Malaysia had 10.1 million users of smart phones in 2015 and was estimated to reach 11 million in 2016 (Statista, 2016). The application of mobile learning in the English language includes a variety of activities like sending SMS and multimedia pictures, using e-mail applications, having group communication as in telephone conference, forum or video conferencing, and browsing related websites (Cobcroft, *et al*., 2006; Corbeil *et al*., 2007; Junior & Coutinho, 2008; Shen, Wang, & Pan, 2008). As such, prior mobile technology experience could assist the lecturers in supplying learning materials while reading and replying the learners' postings (Che *et al*., 2009; Saleem, 2011).

Analysis on hypotheses H1c and H2c showed that prior mobile technology experience had a significant influence on perceived usefulness and perceived ease of use of mobile technology device. The findings supported the studies that found positive significant relationships with perceived usefulness (Tan *et al*., 2012) and perceived ease of use (Theng, 2009). This proves that lecturers who acquire hands-on experience in using mobile phones perceive the devices to be useful and easy to be used as compared to those without related experience. In addition, their prior experience in using mobile phones actually influences the lecturers' perceiveness on how valuable this device can be in supporting mobile learning and teaching practices. This denotes that the lecturers who possess relevant skills and knowledge in handling mobile technology devices such as conducting group discussions using mobile phone applications would have a better understanding on the beneficial features of mobile devices. As stated by Mac Callum, Jeffrey and Kinshuk (2014), educators who are knowledgeable and have good comprehension of using mobile technology devices are more innovative in designing and employing mobile learning and teaching activities.

5.2.2 Discussions on Research Objective Two

The second research objective was to examine whether perceived ease of use (PE) had a significant influence with perceived usefulness (PU) of mobile technology. One hypothesis (H3) was developed to investigate the relationship between PE and PU and the result found that the relationship was significant. The finding was consistent with previous studies of TAM that focused on the usage of mobile technology devices (Conci, Pianesi, & Zancanaro, 2009; Farzana & Ainin, 2008; Kim & Garrison, 2009; Ramayah & Norazah, 2006) which denoted that lecturers who can readily use mobile device perceive it as a useful study tool (Joo, Lee, & Ham, 2014). Furthermore, if the lecturers perceive the mobile technology device is easy to interact with, they would need less effort to utilise it which contributes to its usefulness in mobile learning and teaching practices. In addition, Ju, Wathanaporn and Do (2008) asserted that users who perceive the technology as easy to use are more likely to perceive the usefulness of the device. In order to increase the engagement of the lecturers in using mobile phone for their teaching activities, they need to be exposed to trainings that could enhance their knowledge and skill in using this device.

5.2.3 Discussions on Research Objective Three

The third research objective of this study was to investigate whether perceived usefulness (PU) and perceived ease of use (PE) had an influence on behavioural intention (BI) of using mobile technology. A set of hypothesis (H4a & H4b) was developed to investigate the relationships between the exogenous variables of PU and PE with the endogenous variable of BI.

5.2.3.1 Effect of Perceived Usefulness (PU)

The result of this study concluded that there was a strong positive relationship between perceived usefulness and behavioural intention which supported previous literatures of TAM studies in mobile learning (Cheng, 2014; Huang, Lin, & Chuang, 2007; Mac Callum, Jeffrey, & Kinshuk, 2014; Ramayah & Norazah, 2006; Seyal *et al*., 2015; Tan *et al*., 2012; Theng, 2009) and mobile technology (Conci, Pianesi, & Zancanaro, 2009; Farzana & Ainin, 2008; Kim & Garrison, 2009; Ursavas, 2015; van Biljon & Kotze, 2008). Based on the definition given by Fishbein and Ajzen (1975), behavioural intention is the probability that the English language lecturers will perform the intended behavior of using mobile technology devices in their teaching and learning practices. In this case, the lecturers perceive that mobile technology devices are useful as they offer considerable benefits towards learners and their own teaching activities (Mac Callum, Jeffrey, & Kinshuk, 2014). On top of that, this study found that the influence of perceived usefulness was rather powerful (C.R=17.353) which made it a strong predictor of behavioral intention. As such, institutions should not ignore the prominence of perceived usefulness when implementing and integrating such technology (Davis, 1989).

5.2.3.2 Effect of Perceived Ease of Use (PE)

In contrast to perceived usefulness, the analysis confirmed there was no significant relationship between perceived ease of use and behavioural intention which supported the review of literatures that perceived ease of use exhibited inconsistent relationship. As asserted by Lee, Kozar and Larsen (2003), more than 20 percent of TAM studies found insignificant relationship for perceived ease of use as compared to 11 percent for perceived usefulness which suggested that perceived ease of use did not persistently evaluate behavioural intention as compared to perceived usefulness. Other studies that discovered insignificant relationship between perceived ease of use and behavioural intention were related to tablet PC (Ursavas, 2015), mobile learning (Mac Callum, Jeffrey, & Kinshuk, 2014), mobile technology (Chin & Vimala, 2017) and web portal (Tolentino, 2011); whereas mobile phone studies found it to be significant (Conci, Pianesi, & Zancanaro, 2009; Kim & Garrison, 2009; von Biljon & Kotze, 2008). Some studies did not examine the relationship as research (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) assumed perceived ease of use performed more like an antecedent to perceived usefulness rather than being a direct factor towards behavioural intention.

The insignificant effect of perceived ease of use towards behavioural intention in this study may be due to the reason that the lecturers need to spend time developing the content which involves additional work or complexity (Mac Callum, Jeffrey, & Kinshuk, 2014). Most of the respondents (48.7%) had teaching workloads of more than 16 hours per week (refer Table 4.1) and this can cause problems for the lecturers to find suitable applications for teaching and learning activities through the usage of mobile phones. Even though mobile phone is considered a prominent device and a part of a person's daily necessities (Livingston, 2004) especially with its high penetration level of usage in Malaysia, the English language lecturers may have the believe that its accessible and easy usage did not have an impact on their intention to use it in teaching practices.

5.2.4 Discussions on Research Objective Four

The fourth research objective was to ascertain whether perceived usefulness (PU) and perceived ease of use (PE) mediated the relationship between subjective norm (SN), self-efficacy (SE) and prior mobile technology experience (ME) towards behavioural intention (BI) of using mobile technology. Two sets of hypothesis (H5a, H5b, H5c, H6a, H6b & H6c) were developed to ascertain the mediating effects of PU and PE between the external variables of SN, SE and ME with the endogenous variable of BI.

5.2.4.1 Mediating Effects of Perceived Usefulness (PU)

The result on mediating effect showed that perceived usefulness acted as a mediator for the relationship between subjective norm and prior mobile technology experience with the endogenous variable of behavioral intention. A similar result was found from the study of Chun, Lee and Kim (2012) as they concluded perceived usefulness mediated subjective norm and behavioural intention of Korean students who used smartphones. In addition, Burton-Jones and Hubona (2006) also found a mediating effect of perceived usefulness between employees' experience and usage behaviour towards e-mail and word processor applications. The result of this study also found significant direct effects between the external variables of subjective norm and prior mobile experience with the endogenous variable behavioural intention. However, the indirect effects between the variables were only reduced which led to the conclusion that perceived usefulness partially mediates the relationship of those variables.

The external variable of self-efficacy was also used in the investigation of mediating effect but previous study found that perceived usefulness mediated self-efficacy and the endogenous variable of attitude for students who used smartphones in the US (Songpol, Bruner II, & Neelankavil, 2014). However, this study concluded a non-mediating effect since the relationship between self-efficacy and perceived usefulness was not significant. Besides, the direct and indirect effects between self-efficacy and behavioural intention were also found to be insignificant. This means that the lecturers' capability to use mobile phone does not assure them to perceive it as a useful device and consequently be used in their teaching and learning practices. The contradicting result may be due to the different type of sample respondents being used in the studies (Holden & Rada, 2011).

5.2.4.2 Mediating Effects of Perceived Ease of Use (PE)

The analysis on mediating effects showed that perceived ease of use did not act as a mediator for the relationship between the external variables of subjective norm, self-efficacy and prior mobile technology experience with the endogenous variable of behavioral intention. This was due to the insignificant relationship that occurred between perceived ease of use and behavioural intention. Referring to previous studies, it was asserted that perceived ease of use mediated self-efficacy and the endogenous variable of attitude (Songpol, Bruner II, & Neelankavil, 2014) while Punnoose (2012) found that perceived ease of use mediated self-efficacy and perceived usefulness. The opposite result on the mediating effects of perceived ease of use may be due to the different endogenous variable being used in those studies.

The variable perceived ease of use was also used to investigate its mediating effect between experience and usage behaviour. The study conducted by Burton-Jones and Hubona (2006) discovered that perceived ease of use did not have a mediating effect for users of email and word processing because the relationship between perceived ease of use and behavioural intention was not significant. However, the study concluded that experience had a direct effect on system usage which was similar to the result of this study. This is due to the reason that the user most probably would use the device which has become a habit or routine for them to do so without the need to consider the easiness of using it (Burton-Jones & Hubona, 2006).

5.2.5 Discussions on Research Objective Five

The last research objective was to explore whether age, gender and university culture (UC) acted as moderators to the relationship between perceived usefulness (PU) and perceived ease of use (PE) towards behavioural intention (BI) of using mobile technology. Two sets of hypothesis (H7a, H7b, H7c, H8a, H8b & H8c) were developed to assess the moderation effects of age, gender and university culture (UC) on the relationships of PU and PE with the endogenous variable of BI.

5.2.5.1 Moderation Effects of Age

The analysis showed that age moderated the relationship of perceived usefulness and behavioural intention of using mobile technology. Previous studies have also concluded that age was an important moderator towards the key relationship of perceived usefulness and behavioural intention which focused on technology usage of PDA (Arning & Ziefle, 2007), internet (Napaporn, 2007), blended learning (Khechine *et al*., 2014) and mobile learning (Jackson, 2014). This study specifically showed that the relationship between perceived usefulness and behavioural intention was significant for both groups of lecturers but the younger lecturers who aged below 39 years old had a stronger relationship than the older lecturers. This suggests that perceived usefulness is a more salient factor for the younger lecturers as they are more concerned on performing tasks using the mobile technology device in an easy, rapid, and productive way instead of focusing on the outcomes of teaching and learning activities (Khechine *et al*., 2014). However, there were studies that found age did not significantly moderate the relationship between perceived usefulness and behavioural intention such as in the analysis of e-learning (Tarhini, Hone, & Liu, 2014), mobile learning (Wang, Wu, & Wang, 2009) and mobile technology of smart phone (Manimekalai, 2013). The opposite result may be due to the nature of the population which mainly focuses on student respondents (Jackson, 2014).

5.2.5.2 Moderation Effects of Gender

The result for gender as a moderation variable between perceived usefulness and behavioural intention was not supported which concluded that gender had no moderation effect towards the relationship. The non-significant mediator result was also found in previous studies that investigated mobile learning (Jackman, 2014; Wang, Wu, Wang, 2009), blended learning (Khechine, *et al*., 2014) and mobile technology applications (Guo, 2015; Manimekalai, 2013). This means that there was no difference in the effect of perceived usefulness on behavioural intention between the female and male lecturers of UiTM. In other words, both genders had the same recognization that using mobile technology devices would be useful in teaching and learning activities. Even though the result was in contrast with the initial study of Venkatesh *et al*. (2003), they commented that gender difference would have a decreasing impact over time as younger generations consider technology as common and universal. In addition, Krechine *et al*. (2014) remarked that the opposite finding may be due to the educational context of which both genders have similar attributes when using technology in order to achieve the teaching and learning goals.

5.2.5.3 Moderation Effects of University Culture (UC)

The construct university culture, which originally composed of nine indicators, was developed based on a lecturer's workload and modified in relation to the working culture of UiTM. According to Cooper (1994), organizational culture contributes a significant role towards a person's willingness to adopt technology since culture integrates values and beliefs that represent the qualities of the organisation (Fralinger & Olson, 2007). As asserted by Windschitl and Sahl (2002), organisational culture gives an impact on the individual's decision to use technology and this justifies the integration of university culture variable for this study. However, studies that focused on cultural aspects in relation to the users' intention to be engaged in mobile learning or mobile technology devices are still lacking (Shamsul Arrieya, 2011).

Based on the analysis of congeneric measurement model, four items of university culture construct (UC1, UC2, UC3 & UC4) were removed as they had low values of standardized factor loadings (less than 0.60) which resulted into only five items left for this construct (UC5, UC6, UC7, UC8 & UC9). The four items considered as having weak effects on university culture variable were statements that reflected the status of UiTM as a university (UC1: teaching university; UC2: research university), and the teaching workload (UC3: teaching hours; UC4: teaching approaches). The low factor loadings on items UC1 and UC2 indicate that the English language lecturers in UiTM do not fully appreciate and understand the mission and vision of UiTM as they are uncertain of the status that UiTM is implementing. For example, the former Vice Chancellor of UiTM, Tan Sri Dato' Sri Ir. Dr. Sahol Hamid bin Abu

Bakar, announced that UiTM was an entrepreneurial university in 2014. However, its strategic planning stated that UiTM is a comprehensive university that prioritized on teaching and learning, research and innovation, as well as community service whereas its aspiration clarified that UiTM will achieve the status of a research-based university by the year 2020 (Pejabat Pendaftar, 2013).

In addition, items UC3 and UC4 which focused on teaching workload also had low factor loadings. The low factor loading for item UC3 means that majority of the English language lecturers are not practicing a teaching workload of 16 to 18 hours a week. This may be due to the reason that some of the lecturers are performing administrative task (i.e. head of department, coordinator etc.) in which they have less teaching workload hours (i.e. 8 to 10 hours a week). On the other hand, some lecturers may also have to teach more than 18 hours per week (i.e. 20 to 24 hours a week) due to the inadequate number of English lecturers for each campus. The low factor loading for item UC4 means that the lecturers may still consider the approach for the teaching of the English language as traditional and common (i.e. face-to-face, text book usage, power point slides) as opposed to e-learning, blended learning or mobile teaching approaches. The reason for this is due to the fact that the teaching hours for diploma courses are 4 hours a week whereas the degree courses consist of 2 hours a week. Moreover, most of the English language courses are supported with prescribed text books published by the university itself. This further limits the various teaching approaches that can be applied in the classroom.

The remaining five items for the university culture construct focused on the lecturer's research and publication works (UC5, UC6, UC7) and service to university and community (UC8 & UC9). It should be noted that the items for lecturer's research and publication works had high factor loadings (more than 0.80) which denoted that the English language lecturers in UiTM considered these activities as important tasks in UiTM culture. This could be due to the reason that publication outcomes are a crucial part of promotion evaluation. Moreover, service to the university and community is also considered a prominent task that each lecturer needs to fulfill since the yearly performance appraisal is evaluated based on the involvement in these areas besides teaching and publication works.

For the moderation analysis purpose, the UC construct was based on these five items only (UC5, UC6, UC7, UC8 & UC9). The analysis indicated that university culture had no significant moderation effect towards the relationship of perceived usefulness and behavioural intention of using mobile technology devices. As such, it signifies that university culture of UiTM does not affect the English language lecturers' behavioural intention to use mobile technology devices even though they perceive the device to be useful in their teaching and learning activities. In other words, the working culture of the lecturers in UiTM such as publishing books and research paper besides fulfilling the duties of professional services to the university and community does not have a significant influence on the usefulness of using mobile technology device in teaching practices. In support to this, a similar research was also done to observe the effect of culture on the academics behaviour of using internet. The study found that research culture of the university in Thailand did not have a moderate effect between perceived usefulness and behavioural intention of the lecturers to use internet (Napaporn, 2007). Even though TAM studies were conducted in Malaysia to investigate users' intentions to utilize mobile technology devices (Farzana & Ainin, 2008; Issham *et al*., 2013; Manimekalai, 2013; Wong & Teo, 2008), no research was found to examine the moderation effect of Malaysian institution's culture towards the educator's behavioural intention. Consequently, this study offered novel information on the study of culture influence towards users' behavioural intention of using mobile technology device.

5.3 Implications of Findings

This study provides several potential and important implications that are allotted into two parts which are theoretical implications and practical implications. The discussions on each implication are discussed in the following sections.

5.3.1 Theoretical Implications

Being a robust model, Technology Acceptance Model (TAM) has been widely used by researchers with minor modifications to study the acceptance and behavioural usage of technology (Davis & Venkatesh, 1996). This study incorporated TAM (Davis, Bagozzi, & Warshaw, 1989) and its extension models (Venkatesh, 2000; Venkatesh & Davis, 2000) in order to investigate the factors that influence the English language lecturers to use mobile technology devices in their teaching and learning practices. The analysis on the main constructs of perceived usefulness, perceived ease of use and behavioural intention provided evidences that supported the previous findings of TAM studies and its appropriateness to measure the intention of using such technology. Even though the non-significant relationship between perceived ease of use and behavioural intention was supported by previous literature, the effect of perceived ease of use could have been influenced by the younger lecturers who are considered to be technology-enabled. This is similar to studies that adopted students as respondents; thus, this study offers an affirmation to those studies (Mac Callum, Jeffrey, & Kinshuk, 2014; Tolentino, 2011; Ursavas, 2015) with similar findings. According to Rafizah *et al*. (2017), technology usage is very common among the Gen Y (35-46 years old) and Gen Z or millennials (18-34 years old). Even though both generations show similar mobile phone usage behaviour and they are highly connected to social media applications, Gen Z individuals are found to be avid users of entertainment and game applications (RealityMine, 2015). On the other hand, CompTIA (2013) reported that Gen Y workers had a higher percentage of mobile phone usage for work purposes as compared to Gen X or Baby Boomers (47-65 years old).

Moreover, a review on the literature of TAM found that not many studies (Burton-Jones & Hubona, 2006; Chun, Lee, & Kim, 2012; Punnoose, 2012; Songpol, Bruner II, & Neelankavil, 2014) investigated the mediating effects of perceived usefulness and perceived ease of use especially on the direct and indirect effects of the variables which have yet to be approved. It has been mentioned earlier that perceived usefulness acts as a mediator for the relationship between subjective norm and prior mobile technology experience towards behavioural intention. However, perceived ease of use is not a mediator due to its non-significant effect towards behavioral intention. These findings are regarded as important as they actually draw attention to further explain the relationships among the variables. As such, this study provides substantial support and impact on the mediating analysis of TAM variables which could be used for further verification of the main constructs.

Based on literature and the proposition of Legris, Ingham and Collerette (2003), this study extended TAM by including the external variables of subjective norm, self-efficacy and prior mobile technology experience in the role to offer a better understanding on the variables that influence perceived usefulness, perceived ease of use and behavioral intention of using such technology. Using academicians or lecturers as the respondents, this study may be the first one that empirically extends TAM by including those three external variables. The significant findings on the relationship between subjective norm and prior mobile experience variables towards perceived usefulness and perceived ease of use contributed a comprehensive understanding of the English lecturers' behavioural intention in using mobile technology devices and supplemented the literature of technology acceptance concerning various type of technology. In other words, the modifications and validation measures of these variables can be considered as an important contribution to the development of TAM.

In addition, this study included several types of moderators based on UTAUT model (Venkatesh et. al., 2003) since Sun and Zhang (2006) asserted that the inclusion of moderators could enhance the explanatory power of a research model. The moderators adapted from UTAUT were age and gender while the moderator university culture was newly constructed based on the responsibilities of UiTM lecturers. Culture is integrated in the model since culture can affect a person's routine to perform certain behaviours (Zakour, 2004). Being a newly construct variable, exploratory factor analysis was conducted on university culture to identify its underlying relationships between the measured variables while confirmatory factor analysis was performed to measure the items that come together to represent the construct and to assess the model's goodness of-fit (GOF) (Hair *et al*., 2010). The congeneric measurement model of university culture finally excluded four items from the initial nine items and these were used to measure university culture as a moderator variable. Although the findings concluded that only age had a moderation effect on perceived usefulness and behavioural intention, the design of university culture variable in this study has given a noteworthy implication as it reflects the working culture of the English language lecturers in UiTM. Therefore, the usage of university culture as a moderator in TAM is deemed to be a novel contribution of this study.

5.3.2 Practical Implications

The results derived from this study could also provide several practical implications towards several parties including the English language lecturers, higher educational institution and educational authorities. As presented in the findings section, the perceptions of the English language lecturers of UiTM towards using the mobile technology device in their teaching and learning activities are basically formed based on demographic differences, individual beliefs, social influence and organizational cultural values. As such, these different factors should be taken into consideration when promoting the usage of mobile technology devices among academicians since its implementation could improve their professional practice, development and quality of work.

The determinant perceived usefulness was found to be important in determining the behavioural intention of the English language lecturers in using mobile technology devices. Thus, the management of UiTM could increase the intention of these lecturers to use the device by presenting them the usefulness and its usable ways in teaching and learning activities which could be implemented through trainings and workshops. Since the concept of mobile learning has been introduced and widely practiced especially in the teaching and learning of the English language, university could emphasize workshops that cater on the specific activities the lecturers could perform when using mobile technology device. This would enable the lecturers to better comprehend the usefulness of the device and subsequently promote its usage among the students. For example, the lecturers could be trained on how to creatively use popular social media sites such as Facebook, WhatsApp, Twitter or Instagram applications (Maina, 2016) which are easily accessible using mobile technology devices (i.e. smart phones) for sharing of ideas and discussion purposes in order to enhance the students' communication skills. Networking and communicating activities through social media sites are becoming popular since mobile users are spending more time on these applications using mobile devices than personal computers (Dube, 2012).

Since individual differences such as age has an impact on the user's intention, the management of the university should tailor the training method and approach in order to meet the needs of the lecturers. Moreover, older people in the early stages of adopting a certain technology seemed to require resources and assistance to ensure that they could use the technology continuously. Therefore, the university has to ensure proper support and facilities are provided to ensure the users are capable to use the device effectively. In addition, since ease of use has a strong relationship and impact towards the users' perception on the usefulness of the device, the training session should emphasize on communicating the easiness of using the mobile technology device (i.e. smart phones) in order to convince the lecturers that the device would actually bring value and benefit towards their job applications.

Subjective norm was concluded to be important in influencing the intention of the lecturers to adopt mobile teaching device in their working practices. Since peers, colleagues and students could inspire and encourage the academicians to use the device, the university should consider this as a positive stance towards technology acceptance. Younger generations like students are deemed to be technology-savvy;

thus, they could be prompted to be the initial users of mobile technology device either outside or inside the classroom and consequently promote its usage among the lecturers themselves. In addition, the young lecturers could also instigate the usage by sharing their expertise and knowledge through trainings and workshops with the older colleagues. It should also be noted that social influence can be positively created by word-of-mouth among the users. As such, the administrators should realize the importance of subjective norm by creating a favourable organisational condition towards its usage in the university.

The implications of self-efficacy and prior experience have to be taken into account when implementing a new technology among users. This is because if the lecturers possess good skills and knowledge in using the technology, there is a greater tendency for them to perceive its usefulness and ease of use which could lead to a higher disposition of using the device. Self-efficacy of the lecturers in using mobile technology devices can be reinforced through refreshment courses in order for them to be illiterate and increase their self-confidence in using the technology. Furthermore, information on prior experience of the users can be used to identify the related skills necessary to utilise mobile technology device in order to boost the lecturer's acceptance and use of the device. However, it should be kept in mind that skills and knowledge of using the technology could not be developed in a short time since it is actually a continuous process and it depends on the user's willingness to fully utilise the device in everyday usage. Thus, the university should constantly conduct training sessions that expose the lecturers with the latest development of technology usage and at the same time encourage the academicians to be persistently engaged in its application. Fostering the usage of mobile technology device in the university could be done effectively by authorizing its usage as a policy in enhancing teaching and learning activities or by offering incentives such as promotion to the lecturers.

The university culture construct was newly developed in this study in order to examine whether it moderated the intention of the English lecturers' intention to use mobile technology device in teaching and learning practices. Even though the result found university culture had no moderation effect, the factor analysis conducted on the items of university culture provided noteworthy information regarding the perception of the lecturers towards the culture of the university. The deletion of items on UiTM being a teaching or research university denotes the uncertainty of the lecturers towards the aspiration that the university is targeting on. Therefore, it is necessary for the management of UiTM to evidently depict its strategic planning on the status of the university to its workforce particularly the academicians as they are the forces that seek to achieve the aspiration of the university. In addition, the removal of teaching approach item should be taken into consideration as this may reflect the possibility that the lecturers are still practicing the traditional method of teaching approach as opposed to the dynamic and innovative methods of teaching like e-learning, blended learning and even mobile learning. These current teaching approaches should be integrated in the university in order to fulfill UiTM human resources policy that stated the academicians should be equipped with appropriate knowledge and skills through competency and continuous learning development (Pejabat Pendaftar, 2013). On top of that, the former Vice Chancellor of UiTM, Tan Sri Dato' Sri Ir. Dr. Sahol Hamid bin Abu Bakar, asserted that UiTM lecturers should be involved in teaching and learning innovations such as e-learning so that teaching practices could be broaden to promote the culture of academic excellence (Universiti Teknologi MARA, 2014).

The introduction of mobile learning using mobile technology devices in higher learning institutions of Malaysia has become inevitable due to the extraordinary growth of mobile phone users and the rapid decline in the cost of mobile phones and subscription plans. Mobile learning is further emphasized through the development of wireless network (Kimura, 2009) as it lessens the requirement of computer labs, workforce assistance and servicing costs (Mahendar Kumar & Arpita, 2013). According to the education development plan of Malaysia for the year 2013 to 2025, one of the shifts to deliver the change in education outcome is utilizing ICT in order to improve the quality of teaching and learning in Malaysia which means maximizing the use of technology so that educators could expand high-quality teaching while students enjoy greater educational experience (Kementerian Pendidikan Malaysia, 2013). This innovation is promoted through distance learning programmes which integrate the usage of mobile technology devices. Thus, this research contributes to the development of ICT usage in education specifically on the utilization of mobile technology devices since it emphasizes on the readiness of the educators to use these devices in their teaching and learning practices. The understanding on the factors that influence educators plays a significant role as they are the facilitators that direct the students to effectively use the functions of mobile technologies (Kukulska-Hulme, 2013). In order to support the development of technology usage at the nation level, the management of the university needs to cultivate positive user attitude towards mobile learning. Consequently, such information like in this study could be used to support the development of technology usage and achieve the future policy of the university and nation.

5.4 Limitations and Recommendations

The study on technology acceptance specifically on the area of mobile technology device is still considered in its developing stage particularly in the Malaysian education situation. The conduct of this research, which was based on previous empirical and theoretical studies, has provided knowledge and further understanding on the perception of users towards the usage of mobile technology device especially when it comprised of educators in the largest higher learning institution in Malaysia. Nevertheless, there are still some limitations encountered by this study which could be used to provide more opportunities for other future research.

Firstly, this study utilized Technology Acceptance Model (Davis, 1989) that originated from the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and Theory of Planned Behaviour (Ajzen, 1991). The initial model of TAM included attitude as a mediating variable between the two variables of perceived usefulness and perceived ease of use with the behavioral intention variable. For this research, the attitude variable was not incorporated in the framework since Davis, Bagozzi, and Warshaw (1989) concluded that it only partially mediated the behavioural intention variable and it produced a non-significant relationship for samples other than students (Yousafzai, Foxall & Pallister, 2007). However, the review by Kim, Chun and Song (2009) considered the importance of attitude variable in determining users' behavioural intention to use technology. Consequently, further research should consider its integration in the model and examine its effect towards behavioural intention.

In addition, the framework of the study adapted the extended models of TAM which investigated the external variables of perceived usefulness (Venkatesh & Davis, 2000) and perceived ease of use (Venkatesh, 2000). The selection of external variables in this study was based on the analysis made by Lee, Kozar and Larsen (2003) who identified several variables that yielded a mixed result with the major variables of TAM which included self-efficacy and subjective norms. In order to extend the understanding of factors that could influence the users to use mobile technology device, further research could adopt other mixed-result external variables classified by Lee, Kozar, and Larsen (2003) such as voluntariness, end user support, complexity, accessibility, and objective usability. In another view, further studies could also employ external variables used in TAM studies that focused on mobile learning, mobile phones, mobile technology, and e-learning like personal innovativeness (Cheng, 2014; Joo, Lee, & Ham, 2014), anxiety (Chen & Tseng, 2012; Chen *et al*., 2013; Mac Callum, Jeffrey, & Kinshuk, 2014) and support/facilitating conditions (Conci, Pianesi, & Zancanaro, 2009; Lu *et al*., 2003; Park, 2006; Teo & Zhou, 2014; van Biljon & Kotze, 2008). Results obtained from the analysis of other external variables in TAM could increase the understanding of factors that influence academicians to adopt mobile technology device besides enriching the literature of TAM studies.

Another limitation of this study is related to the selection of the endogenous variable. The original TAM applied the variable of actual usage behaviour whereas this study employed behavioural intention since the practice of mobile technology device in teaching and learning activities have not been fully integrated or made compulsory in UiTM. Since the respondents are not expected to experience or perform actual usage of mobile technology devices in their work tasks, they may only use their perceptions or current knowledge to provide feedbacks on the given questionnaire. With the purpose to ensure that the usage of such technology is inflated and expanded, it is necessary for the university to gradually integrate its implementation as an innovative measure. Thus, future studies could possibly be conducted to gauge the relationship between behavioural intention and actual usage of mobile technology devices among the academicians in UiTM. This will certainly add significant value on the association between intention and actual behaviour of technology usage which is still considered rather inconclusive in TAM studies.

Moreover, the findings of this study were based on a cross-sectional type of data collection which could lead to a different result as their intentions to use mobile technology devices may change over time. Even though the study has limitations since it did not examine the actual technology usage but rather the prediction of usage, the causal relationship between behavioural intention and actual usage were verified by previous research (Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000). In respect to confirm that the analysis of the study remains constant and accurate, a more rigorous test such as a longitudinal approach of study could be performed. As proposed by Akour (2009), studies may possibly be conducted at different stages of adoption such as in its initial and later stages or comparing its pre-implementation with post-implementation phases.

The integration of moderator variable in this study was adapted based on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003) which investigated the moderation effects of gender, age, experience and voluntariness towards the main variables of UTAUT. Nevertheless, the framework of the study was delimited due to the exclusion of the variables experience and voluntariness since the respondents were assumed to belong to the same group of expertise and the application of mobile technology devices in UiTM was considered unintentional. Future studies are recommended to investigate the effects of these moderator variables besides including other related demographic variables such as education and academic position which may generate noteworthy results that could provide insights on individual differences to the management of the university.

As mentioned by Windschitl and Sahl (2002), the culture of an education institution gave an impact on the educator's decision to use a certain technology. Due to this, the moderator variable of university culture was newly developed in this study to cater the common practices of UiTM lecturers in terms of university status, teaching and research activities, besides commitment towards university and community. Even though factor analysis identified that several items were considered unimportant among the English language lectures of UiTM due to its low loadings, other studies should still use the initial developed items in order to further confirm and validate the significance of those items especially when using different samples of academicians in UiTM. This eventually would lead to a better verification of the university culture variable in respect to UiTM scenario. In addition, researcher from other universities could also revise on the relevance of those items in order to suit the culture of the respective university.

In relation to methodological aspect, common method bias could raise a restriction towards the evaluation on the association of the variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) since the respondents self-reported the answers on the given questionnaires. However, this study overcame the issue since the result on common method bias analysis revealed that the data was not corrupted by the single source biasness. Although the review by Malhotra, Kim, and Patil (2006) revealed that common method variance was not a serious issue in TAM studies, future research should still employ a more rigorous approach to control measurement and method biases. This can be done by vigilantly scrutinizing the background of the research, recognizing the possible sources of bias, employing all procedural remedies in relation to questionnaire design and acquiring the measures of variables from different sources (Podsakoff *et al*., 2003).

Another common limitation faced by most researchers conducting a quantitative study is the low response rate of the respondents. The response rate of this study was acceptable (57.2%) with a total of 337 questionnaires collected which fulfilled the assumptions of Structural Equation Modeling (SEM) procedures using the Analysis of Moment Structures (AMOS) software. As suggested by Hair *et al*. (2010), a minimum sample of 300 respondents is required if the model consists of less than seven main constructs with lower communalities value (below 0.45). For the investigation on the impact of moderators in group analysis, it is recommended to have a sample size of 10 times the number of estimated coefficients (Hair *et al*., 2010) which is about 60 respondents for this study. Careful consideration should be assigned on the sample size since it may give an impact on the results of the study. In order to increase the response rate of other studies similar to this one, the researcher proposes that data collection should be done using other approaches like sending e-mails to the identified respondents or personally contact and meet the respective persons.

The generalizability of the sampling was also another limitation encountered by this study as it only focused on the English language lecturers of UiTM. Future studies could address this concern by investigating academicians from other faculties in the respective UiTM campuses (i.e. Faculty of Business Studies and Management, Faculty of Computer Science and Mathematics etc.) or those from other public and private universities in Malaysia. Comparison of the results could be made by the university management in order to increase the understanding of mobile technology device acceptance among academicians in higher learning institutions. Moreover, forthcoming researcher could also explore other unit of study such as students so that it presents an overall knowledge of mobile technology device perception among users in university.

5.5 Chapter Summary

The last chapter of this research work provided the explanation and justification for each objective and hypothesis being investigated with the aim to fulfill the five objectives of the research. For objective one, subjective norm and prior mobile technology experience had significant influences on perceived usefulness whereas the three external variables had significant relationship with perceived ease of use. The significant relationship between perceived ease of use and perceived usefulness confirmed the second objective of the study while the third objective merely verified the influence of perceived usefulness towards behavioural intention. For the fourth objective, only perceived usefulness was found to mediate the relationships of subjective norm and prior mobile technology experience with behavioural intention of using mobile technology device. The final objective concluded that age was the only moderator found to influence perceived usefulness and behavioural intention.

The chapter also discussed its theoretical implications towards TAM studies and the practical implications of the research which could be used to assist the lecturers, university management and education policy makers to have a better understanding towards the usage of mobile technology devices in teaching and learning practices. Finally, the chapter presented the limitations of the study along with the suggestions and recommendations that future researcher could consider in their studies.

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APPENDICES

Appendix A
Questionnaire Survey

Dear respondent,

I am a PhD student under the supervision of Assoc. Prof. Dr Ahmad Jelani bin Shaari at Awang Had Salleh Graduate School of Arts and Sciences, Universiti Utara Malaysia.

You have been chosen to be a part of a study entitled '*Determinants of Mobile Technology Acceptance among English Language Lecturers: A Study at Universiti Teknologi MARA'*. The objective of the study is to identify the determinants that will demonstrate acceptance and intention to use mobile technology devices by English language lecturers in UiTM. It aims to understand your needs and potentials so that they can be included in future instructional designs and university policies.

Mobile technology devices consist of portable computers or laptops, mobile phones, smart phones, PDAs, and MP3 devices such as the iPod. However, this study only focuses on personal form of mobile technology which includes mobile phones and smart phones.

The result of this study will contribute to the knowledge regarding the identification of determinants that significantly influence the intention of English language lecturers in using mobile technology especially in teaching practices. Furthermore, it is expected that the results will provide information to the management of the university in improving professional practice and work quality.

I would appreciate your responses to this study as they may be very valuable and have an impact on future university policy. This study requires you to complete a questionnaire survey consisting of eight sections. All information provided will be kept strictly confidential and stored in a secure environment. The results of this study would be used for academic purpose only.

If you have any queries regarding this study, please contact (019-9391568) or email (nazihah71@gmail.com) the researcher.

Your help in completing this questionnaire is greatly appreciated. Thank you very much for your time and cooperation.

Yours sincerely,

Wan Nazihah binti Wan Mohamed

DETERMINANTS OF MOBILE TECHNOLOGY ACCEPTANCE AMONG ENGLISH LANGUAGE LECTURERS: A STUDY AT UNIVERSITI TEKNOLOGI MARA

SECTION A: DEMOGRAPHIC PROFILE

Instructions: Please mark (X) in the appropriate box for the following questions.

1. Gender
   - ☐ [1]Male
   - ☐ [2]Female

2. Age
   - ☐ [1]Below 29 years
   - ☐ [2]30 – 39 years
   - ☐ [3]40 – 49 years
   - ☐ [4]Above 50 years

3. Highest Education Level
   - ☐ [1]Bachelor Degree
   - ☐ [2]Master Degree
   - ☐ [3]Doctoral Level
   - ☐ [4]Other (please specify) ____________

4. Race
   - ☐ [1]Malay
   - ☐ [2]Chinese
   - ☐ [3]Indian
   - ☐ [4]Other (please specify) ____________

5. Job title
   - ☐ [1]Associate Professor (DM53/54)
   - ☐ [2]Senior Lecturer (DM51/52)
   - ☐ [3]Lecturer (DM45/46)
   - ☐ [4]Contract Lecturer
   - ☐ [5]Other (please specify) ____________

6. Monthly income
   - ☐ [1]Less than RM2000
   - ☐ [2]RM2001 – RM3000
   - ☐ [3]RM3001 – RM4000
   - ☐ [4]RM4001 – RM5000
   - ☐ [5]RM5001 – RM6000
   - ☐ [6]More than RM6001

7. Years working in Universiti Teknologi MARA (UiTM)
   - ☐ [1]Less than 5 years
   - ☐ [2]6 – 10 years
   - ☐ [3]11 – 15 years
   - ☐ [4]16 – 20 years
   - ☐ [5]More than 20 years

8. State Campus
   - ☐ [1]Johor
   - ☐ [2]Kedah
   - ☐ [3]Kelantan
   - ☐ [4]Melaka
   - ☐ [5]Negeri Sembilan
   - ☐ [6]Pahang
   - ☐ [7]Perak
   - ☐ [8]Perlis
   - ☐ [9]Pulau Pinang
   - ☐ [10]Sabah
   - ☐ [11]Sarawak
   - ☐ [12]Selangor
   - ☐ [13]Terengganu

9. Teaching hours (per week)

- ☐ [1]Less than 8 hours
- ☐ [2]9 – 12 hours
- ☐ [3]13 – 16 hours
- ☐ [4]17 – 20 hours
- ☐ [5]More than 20 hours

10. Type of mobile technology device(s) you currently own (you can tick more than one)

- ☐ [1]Cell/mobile phone
- ☐ [2]Smart phone
- ☐ [3]Tablet
- ☐ [4]PDA
- ☐ [5]Laptop/notebook
- ☐ [6]MP3 player
- ☐ [7]Other (please specify) ____________

11. Experience in using mobile technology devices

Cell/mobile phone	Smart phone	Tablet	PDA	Laptop/ notebook	MP3	
☐	☐	☐	☐	☐	☐	[1]N/A
☐	☐	☐	☐	☐	☐	[2]< 1 year
☐	☐	☐	☐	☐	☐	[3]1-3 years
☐	☐	☐	☐	☐	☐	[4]3-6 years
☐	☐	☐	☐	☐	☐	[5]> 6 years

12. Average amount of time spent on mobile technology device(s) on a daily basis

Conversation	Messaging	Internet (Web/email)	Games/ Music	Learning/ Educational	
☐	☐	☐	☐	☐	[1]N/A
☐	☐	☐	☐	☐	[2]< 1 hour
☐	☐	☐	☐	☐	[3]1-3 hours
☐	☐	☐	☐	☐	[4]3-6 hours
☐	☐	☐	☐	☐	[5]> 6 hours

13. Have you ever attended any training course, workshop or seminar on using mobile technology devices?

- ☐ [1]Yes
- ☐ [2]No

14. Have you ever used your mobile phone or smart phone for learning or educational purposes?

- ☐ [1]Yes
- ☐ [2]No

SECTION B: UNIVERSITY CULTURE (UC)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. UiTM is a highly reputable teaching university.	1	2	3	4	5	6	7
2. UiTM plans to be a research university in the future.	1	2	3	4	5	6	7
3. UiTM lecturers need to fulfill the teaching hours of 16 to 18 hours a week.	1	2	3	4	5	6	7
4. UiTM lecturers need to teach using various approaches (i.e. face-to-face, e-learning, blended learning, mobile learning)	1	2	3	4	5	6	7
5. UiTM lecturers need to obtain grants and conduct research.	1	2	3	4	5	6	7
6. UiTM lecturers need to produce publications of professional reports (i.e. journal articles)	1	2	3	4	5	6	7
7. UiTM lecturers need to present papers in conferences	1	2	3	4	5	6	7
8. UiTM lecturers need to perform professional service duties to the faculty and/or university (i.e. administration and committee work)	1	2	3	4	5	6	7
9. UiTM lecturers need to perform professional service duties to the community (i.e. consultancy and community activities)	1	2	3	4	5	6	7

SECTION C: BEHAVIOURAL INTENTION (BI)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I intend to use mobile phone in my teaching practices.	1	2	3	4	5	6	7
2. I predict I would use mobile phone in my teaching practices.	1	2	3	4	5	6	7
3. I plan to use mobile phone in my teaching practices.	1	2	3	4	5	6	7
4. I would enjoy using mobile phone for teaching purposes.	1	2	3	4	5	6	7
5. I would recommend others to use mobile phone for teaching purposes.	1	2	3	4	5	6	7

SECTION D: PERCEIVED USEFULNESS (PU)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. Using mobile phone would likely improve my teaching performance.	1	2	3	4	5	6	7
2. Using mobile phone would likely increase my teaching productivity.	1	2	3	4	5	6	7

3. Using mobile phone would likely enhance the effectiveness of my teaching practices.	1	2	3	4	5	6	7
4. Using mobile phone would likely be useful in my teaching practices.	1	2	3	4	5	6	7
5. Using mobile phone would likely enable me to accomplish teaching tasks more quickly	1	2	3	4	5	6	7

SECTION E: PERCEIVED EASE OF USE (PE)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I would likely find my interaction with mobile phone to be clear and understandable.	1	2	3	4	5	6	7
2. I would likely find mobile phone easy to use.	1	2	3	4	5	6	7
3. I would likely find it easy to get mobile phone to do what I want it to do.	1	2	3	4	5	6	7
4. I would likely find mobile phone flexible to interact with.	1	2	3	4	5	6	7
5. I would likely find my interaction with mobile phone does not require a lot of my mental effort.	1	2	3	4	5	6	7
6. I would likely find it easy for me to be skillful at using mobile phone.	1	2	3	4	5	6	7

SECTION F: SUBJECTIVE NORM (SN)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. People who influence my behaviour think that I should use mobile phone in my teaching practices.	1	2	3	4	5	6	7
2. People who are important to me think that I should use mobile phone in my teaching practices.	1	2	3	4	5	6	7
3. My students think that I should use mobile phone in my teaching practices.	1	2	3	4	5	6	7
4. My peers think that I should use mobile phone in my teaching practices.	1	2	3	4	5	6	7
5. The lecturers in my faculty have been helpful in the use of mobile phone in my teaching practices.	1	2	3	4	5	6	7
6. In general, the organization has supported the use of mobile phone in my teaching practices.	1	2	3	4	5	6	7

SECTION G: SELF-EFFICACY (SE)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I could complete a task using mobile phone if no one is around to tell me how to use it.	1	2	3	4	5	6	7
2. I could complete a task using mobile phone if I could call someone for help if I got stuck.	1	2	3	4	5	6	7
3. I could complete a task using mobile phone if someone shows me how to do it first.	1	2	3	4	5	6	7
4. I could complete a task using mobile phone if someone helps me to get started.	1	2	3	4	5	6	7
5. I could complete a task using mobile phone if I have a lot of time to do it.	1	2	3	4	5	6	7
6. I could complete a task using mobile phone if I have never used a product like it before.	1	2	3	4	5	6	7
7. I could complete a task using mobile phone if I have the built-in help facility for assistance.	1	2	3	4	5	6	7

SECTION H: PRIOR MOBILE TECHNOLOGY EXPERIENCE (ME)
Instructions: Please rate the extent to which you agree with each statement below.

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5= Slightly Agree 6= Quite Agree 7= Strongly Agree							
1. I am able to access information on the internet using mobile phone.	1	2	3	4	5	6	7
2. I am able to send and read emails using mobile phone.	1	2	3	4	5	6	7
3. I am able to send and receive Short Messaging System (SMS).	1	2	3	4	5	6	7
4. I am able to send and receive Multimedia Messaging System (MMS).	1	2	3	4	5	6	7
5. I am able to use mobile phone to play games.	1	2	3	4	5	6	7
6. I am able to use mobile phone for social networking activities.	1	2	3	4	5	6	7
7. I am able to write notes using mobile phone application.	1	2	3	4	5	6	7

Thank you for completing the questionnaire

Appendix B
Pilot Test Analysis

Behavioural Intention (BI):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.969	.969	5

Inter-Item Correlation Matrix

	BI1	BI2	BI3	BI4	BI5
BI1	1.000	.812	.876	.847	.829
BI2	.812	1.000	.897	.845	.791
BI3	.876	.897	1.000	.928	.879
BI4	.847	.845	.928	1.000	.932
BI5	.829	.791	.879	.932	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BI1	21.74	22.227	.882	.786	.967
BI2	21.76	22.875	.876	.809	.968
BI3	21.77	21.686	.953	.916	.955
BI4	21.81	21.667	.944	.921	.957
BI5	21.82	22.279	.905	.875	.963

Perceived Usefulness (PU):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.973	.973	5

Inter-Item Correlation Matrix

	PU1	PU2	PU3	PU4	PU5
PU1	1.000	.903	.873	.852	.807
PU2	.903	1.000	.952	.910	.842
PU3	.873	.952	1.000	.926	.866
PU4	.852	.910	.926	1.000	.861
PU5	.807	.842	.866	.861	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PU1	20.94	21.635	.895	.825	.970
PU2	20.79	20.988	.951	.930	.962
PU3	20.81	20.159	.954	.931	.961
PU4	20.66	21.047	.933	.879	.964
PU5	20.81	20.749	.877	.779	.973

Perceived Ease of Use (PE):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.969	.970	6

Inter-Item Correlation Matrix

	PE1	PE2	PE3	PE4	PE5	PE6
PE1	1.000	.900	.844	.872	.744	.809
PE2	.900	1.000	.899	.916	.769	.811
PE3	.844	.899	1.000	.911	.780	.866
PE4	.872	.916	.911	1.000	.777	.877
PE5	.744	.769	.780	.777	1.000	.872
PE6	.809	.811	.866	.877	.872	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PE1	28.26	30.555	.889	.830	.965
PE2	28.11	29.872	.921	.902	.961
PE3	28.08	30.043	.923	.874	.961
PE4	28.03	30.884	.937	.903	.960
PE5	28.21	30.923	.833	.778	.971
PE6	28.10	30.482	.907	.878	.963

Subjective Norm (SN):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.933	.934	6

Inter-Item Correlation Matrix						
	SN1	SN2	SN3	SN4	SN5	SN6
SN1	1.000	.858	.601	.608	.613	.612
SN2	.858	1.000	.660	.697	.585	.596
SN3	.601	.660	1.000	.885	.672	.686
SN4	.608	.697	.885	1.000	.753	.766
SN5	.613	.585	.672	.753	1.000	.936
SN6	.612	.596	.686	.766	.936	1.000

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SN1	22.82	30.312	.740	.766	.929
SN2	22.82	29.755	.767	.791	.926
SN3	22.37	27.319	.805	.790	.922
SN4	22.74	27.801	.866	.849	.913
SN5	22.97	28.589	.823	.881	.919
SN6	22.89	27.708	.829	.885	.918

Self-Efficacy (SE):

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.921	.922	7

Inter-Item Correlation Matrix							
	SE1	SE2	SE3	SE4	SE5	SE6	SE7
SE1	1.000	.572	.427	.404	.504	.540	.443
SE2	.572	1.000	.823	.791	.698	.682	.667
SE3	.427	.823	1.000	.871	.632	.599	.598
SE4	.404	.791	.871	1.000	.664	.581	.601
SE5	.504	.698	.632	.664	1.000	.623	.707
SE6	.540	.682	.599	.581	.623	1.000	.744
SE7	.443	.667	.598	.601	.707	.744	1.000

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SE1	33.29	37.816	.559	.399	.929
SE2	33.40	34.572	.868	.783	.897
SE3	33.34	34.851	.800	.807	.904
SE4	33.55	34.907	.790	.788	.905
SE5	33.13	36.081	.770	.623	.907
SE6	33.47	36.089	.755	.638	.909
SE7	33.24	36.088	.752	.660	.909

Prior Mobile Technology Experience (ME):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.936	.942	7

Inter-Item Correlation Matrix

	ME1	ME2	ME3	ME4	ME5	ME6	ME7
ME1	1.000	.757	.664	.886	.659	.631	.809
ME2	.757	1.000	.576	.783	.553	.533	.854
ME3	.664	.576	1.000	.699	.519	.921	.627
ME4	.886	.783	.699	1.000	.736	.653	.888
ME5	.659	.553	.519	.736	1.000	.562	.770
ME6	.631	.533	.921	.653	.562	1.000	.625
ME7	.809	.854	.627	.888	.770	.625	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ME1	37.00	36.754	.858	.800	.920
ME2	37.05	35.785	.781	.776	.929
ME3	36.71	41.455	.743	.876	.933
ME4	36.87	36.704	.917	.885	.915
ME5	37.13	35.524	.724	.664	.937
ME6	36.74	41.145	.724	.865	.933
ME7	36.98	35.459	.909	.891	.915

University Culture (UC):

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.875	.882	9

Inter-Item Correlation Matrix

	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9
UC1	1.000	.644	.414	.334	.365	.492	.309	.252	.384
UC2	.644	1.000	.496	.311	.212	.278	.204	.128	.283
UC3	.414	.496	1.000	.353	.141	.241	.127	.412	.301
UC4	.334	.311	.353	1.000	.413	.494	.393	.450	.394
UC5	.365	.212	.141	.413	1.000	.750	.860	.567	.686
UC6	.492	.278	.241	.494	.750	1.000	.871	.733	.813
UC7	.309	.204	.127	.393	.860	.871	1.000	.689	.780
UC8	.252	.128	.412	.450	.567	.733	.689	1.000	.721
UC9	.384	.283	.301	.394	.686	.813	.780	.721	1.000

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
UC1	47.15	37.831	.543	.597	.868
UC2	47.06	39.111	.432	.540	.876
UC3	47.15	36.520	.401	.477	.889
UC4	46.48	39.172	.539	.347	.869
UC5	47.00	34.164	.691	.767	.855
UC6	47.10	34.646	.832	.867	.844
UC7	47.16	34.301	.744	.888	.850
UC8	47.13	34.737	.700	.698	.854
UC9	47.13	34.934	.778	.723	.848

Appendix C
Comments for Content Validity

Appendix D
Outliers Analysis

Boxplot for Gender	*Boxplot for Age*
Boxplot for Highest Education Level	*Boxplot for Race*
Boxplot for Job Title	*Boxplot for Monthly Income*

Boxplot for Years Working in UiTM *Boxplot for State Campus*

Boxplot for Teaching Hours

Appendix E
Demographic Analysis

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	59	17.5	17.5	17.5
	Female	278	82.5	82.5	100.0
	Total	337	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 29 years	100	29.7	29.7	29.7
	30-39 years	87	25.8	25.8	55.5
	40-49 years	94	27.9	27.9	83.4
	Above 50 years	56	16.6	16.6	100.0
	Total	337	100.0	100.0	

Highest Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor Degree	26	7.7	7.7	7.7
	Master Degree	287	85.2	85.2	92.9
	Doctoral Level	24	7.1	7.1	100.0
	Total	337	100.0	100.0	

Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	278	82.5	82.5	82.5
	Chinese	21	6.2	6.2	88.7
	Indian	18	5.3	5.3	94.1
	Other (Please specify)	20	5.9	5.9	100.0
	Total	337	100.0	100.0	

Job Title

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Associate Professor (DM53/54)	9	2.7	2.7	2.7
	Senior Lecturer (DM51/52)	88	26.1	26.1	28.8
	Lecturer (DM45/46)	200	59.3	59.3	88.1
	Contract Lecturer	40	11.9	11.9	100.0
	Total	337	100.0	100.0	

Monthly Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than RM2000	24	7.1	7.1	7.1
	RM2000-RM3000	24	7.1	7.1	14.2
	RM3001-RM4000	66	19.6	19.6	33.8
	RM4001-RM5000	79	23.4	23.4	57.3
	RM5001-RM6000	50	14.8	14.8	72.1
	More than RM6001	94	27.9	27.9	100.0
	Total	337	100.0	100.0	

Years working in University Teknologi MARA (UiTM)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	118	35.0	35.0	35.0
	6-10 years	95	28.2	28.2	63.2
	11-15 years	63	18.7	18.7	81.9
	16-20 years	29	8.6	8.6	90.5
	More than 20 years	32	9.5	9.5	100.0
	Total	337	100.0	100.0	

State Campus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Johor	37	11.0	11.0	11.0
	Kedah	22	6.5	6.5	17.5
	Kelantan	31	9.2	9.2	26.7
	Melaka	39	11.6	11.6	38.3
	Negeri Sembilan	23	6.8	6.8	45.1
	Pahang	29	8.6	8.6	53.7
	Perak	44	13.1	13.1	66.8
	Perlis	17	5.0	5.0	71.8
	Pulau Pinang	13	3.9	3.9	75.7
	Sabah	12	3.6	3.6	79.2
	Sarawak	30	8.9	8.9	88.1
	Selangor	17	5.0	5.0	93.2
	Terengganu	23	6.8	6.8	100.0
	Total	337	100.0	100.0	

Teaching Hours (per week)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 8 hours	8	2.4	2.4	2.4
	9-12 hours	12	3.6	3.6	5.9
	13-16 hours	56	16.6	16.6	22.6
	17-20 hours	164	48.7	48.7	71.2
	More than 20 hours	97	28.8	28.8	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: Cell/Mobile Phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	226	67.1	67.1	67.1
	Ticked	111	32.9	32.9	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: Smart Phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	33	9.8	9.8	9.8
	Ticked	304	90.2	90.2	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: Tablet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	234	69.4	69.4	69.4
	Ticked	103	30.6	30.6	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: PDA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	333	98.8	98.8	98.8
	Ticked	4	1.2	1.2	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: Laptop/Notebook

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	60	17.8	17.8	17.8
	Ticked	277	82.2	82.2	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: MP3 Player

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	289	85.8	85.8	85.8
	Ticked	48	14.2	14.2	100.0
	Total	337	100.0	100.0	

Type of mobile technology device: Others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Ticked	333	98.8	98.8	98.8
	Ticked	4	1.2	1.2	100.0
	Total	337	100.0	100.0	

Experience using Cell/Mobile Phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	84	24.9	24.9	24.9
	N/A	11	3.3	3.3	28.2
	< 1 year	5	1.5	1.5	29.7
	1-3 years	10	3.0	3.0	32.6
	3-6 years	19	5.6	5.6	38.3
	> 6 years	208	61.7	61.7	100.0
	Total	337	100.0	100.0	

Experience using Smart Phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	26	7.7	7.7	7.7
	N/A	11	3.3	3.3	11.0
	< 1 year	19	5.6	5.6	16.6
	1-3 years	43	12.8	12.8	29.4
	3-6 years	96	28.5	28.5	57.9
	> 6 years	142	42.1	42.1	100.0
	Total	337	100.0	100.0	

Experience using Tablet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	157	46.6	46.6	46.6
	N/A	42	12.5	12.5	59.1
	< 1 year	20	5.9	5.9	65.0
	1-3 years	24	7.1	7.1	72.1
	3-6 years	59	17.5	17.5	89.6
	> 6 years	35	10.4	10.4	100.0
	Total	337	100.0	100.0	

Experience using PDA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	225	66.8	66.8	66.8
	N/A	91	27.0	27.0	93.8
	< 1 year	3	.9	.9	94.7
	1-3 years	6	1.8	1.8	96.4
	3-6 years	2	.6	.6	97.0
	> 6 years	10	3.0	3.0	100.0
	Total	337	100.0	100.0	

Experience using Laptop/Notebook

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	18	5.3	5.3	5.3
	N/A	5	1.5	1.5	6.8
	< 1 year	2	.6	.6	7.4
	1-3 years	1	.3	.3	7.7
	3-6 years	22	6.5	6.5	14.2
	> 6 years	289	85.8	85.8	100.0
	Total	337	100.0	100.0	

Experience using MP3 Player

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	191	56.7	56.7	56.7
	N/A	51	15.1	15.1	71.8
	< 1 year	7	2.1	2.1	73.9
	1-3 years	13	3.9	3.9	77.7
	3-6 years	13	3.9	3.9	81.6
	> 6 years	62	18.4	18.4	100.0
	Total	337	100.0	100.0	

Time spent on Conversation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	9	2.7	2.7	2.7
	N/A	38	11.3	11.3	13.9
	< 1 hour	136	40.4	40.4	54.3
	1-3 hours	69	20.5	20.5	74.8
	3-6 hours	33	9.8	9.8	84.6
	> 6 hours	52	15.4	15.4	100.0
	Total	337	100.0	100.0	

Time spent on Messaging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	5	1.5	1.5	1.5
	N/A	24	7.1	7.1	8.6
	< 1 hour	117	34.7	34.7	43.3
	1-3 hours	74	22.0	22.0	65.3
	3-6 hours	46	13.6	13.6	78.9
	> 6 hours	71	21.1	21.1	100.0
	Total	337	100.0	100.0	

Time spent on Internet (Web/Email)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	15	4.5	4.5	4.5
	N/A	15	4.5	4.5	8.9
	< 1 hour	52	15.4	15.4	24.3
	1-3 hours	96	28.5	28.5	52.8
	3-6 hours	71	21.1	21.1	73.9
	> 6 hours	88	26.1	26.1	100.0
	Total	337	100.0	100.0	

Time spent on Games/Music

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	46	13.6	13.6	13.6
	N/A	120	35.6	35.6	49.3
	< 1 hour	94	27.9	27.9	77.2
	1-3 hours	30	8.9	8.9	86.1
	3-6 hours	13	3.9	3.9	89.9
	> 6 hours	34	10.1	10.1	100.0
	Total	337	100.0	100.0	

Time spent on Learning/Educational

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	17	5.0	5.0	5.0
	N/A	13	3.9	3.9	8.9
	< 1 hour	76	22.6	22.6	31.5
	1-3 hours	107	31.8	31.8	63.2
	3-6 hours	83	24.6	24.6	87.8
	> 6 hours	41	12.2	12.2	100.0
	Total	337	100.0	100.0	

Attended training course, workshop or seminar on using mobile technology devices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	96	28.5	28.5	28.5
	No	241	71.5	71.5	100.0
	Total	337	100.0	100.0	

Used mobile phone or smart phone for learning or educational purposes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	268	79.5	79.5	79.5
	No	69	20.5	20.5	100.0
	Total	337	100.0	100.0	

Appendix F
Common Method Bias Analysis

Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.681	43.559	43.559	15.681	43.559	43.559
2	3.783	10.509	54.068			
3	3.443	9.563	63.631			
4	2.207	6.130	69.761			
5	1.694	4.705	74.466			
6	1.082	3.006	77.472			
7	.718	1.995	79.466			
8	.687	1.909	81.375			
9	.596	1.655	83.030			
10	.525	1.458	84.489			
11	.517	1.435	85.924			
12	.487	1.352	87.276			
13	.415	1.153	88.428			
14	.399	1.110	89.538			
15	.385	1.071	90.609			
16	.344	.956	91.565			
17	.311	.864	92.429			
18	.293	.813	93.242			
19	.275	.765	94.007			
20	.244	.679	94.686			
21	.231	.641	95.326			
22	.203	.563	95.889			
23	.187	.520	96.409			
24	.167	.463	96.872			
25	.154	.428	97.301			
26	.152	.422	97.723			
27	.121	.336	98.059			
28	.121	.335	98.394			
29	.103	.286	98.679			
30	.096	.266	98.946			
31	.091	.252	99.198			
32	.072	.199	99.397			
33	.064	.178	99.575			
34	.056	.156	99.731			
35	.051	.142	99.873			
36	.046	.127	100.000			

Appendix G
Confirmatory Factor Analysis

Regression Weights for BI Variable (before modification)

			Estimate	S.E.	C.R.	P
BI1	<---	Behav_Int	1.000			
BI2	<---	Behav_Int	.949	.031	30.749	***
BI3	<---	Behav_Int	1.028	.029	35.148	***
BI4	<---	Behav_Int	1.022	.033	31.185	***
BI5	<---	Behav_Int	1.002	.034	29.557	***

Regression Weights for BI Variable (after modification)

			Estimate	S.E.	C.R.	P
BI1	<---	Behav_Int	1.000			
BI2	<---	Behav_Int	.955	.029	32.436	***
BI3	<---	Behav_Int	1.035	.028	37.110	***
BI4	<---	Behav_Int	.987	.034	29.145	***
BI5	<---	Behav_Int	.961	.035	27.310	***

Regression Weights for PU Variable (before modification)

			Estimate	S.E.	C.R.	P
PU1	<---	Perc_Useful	1.000			
PU2	<---	Perc_Useful	1.030	.027	37.964	***
PU3	<---	Perc_Useful	1.042	.026	40.534	***
PU4	<---	Perc_Useful	.984	.029	34.481	***
PU5	<---	Perc_Useful	.972	.034	28.252	***

Regression Weights for PU Variable (after modification)

			Estimate	S.E.	C.R.	P
PU1	<---	Perc_Useful	1.000			
PU2	<---	Perc_Useful	1.028	.023	43.964	***
PU3	<---	Perc_Useful	1.058	.027	38.761	***
PU4	<---	Perc_Useful	.997	.032	30.830	***
PU5	<---	Perc_Useful	.975	.036	27.028	***

Regression Weights for PE Variable (before modification)

			Estimate	S.E.	C.R.	P
PE1	<---	Perc_Ease	1.000			
PE2	<---	Perc_Ease	1.040	.050	20.951	***
PE3	<---	Perc_Ease	1.137	.051	22.189	***
PE4	<---	Perc_Ease	1.062	.047	22.421	***
PE5	<---	Perc_Ease	1.015	.068	14.992	***
PE6	<---	Perc_Ease	1.022	.052	19.583	***

Regression Weights for PE Variable (after modification)

			Estimate	S.E.	C.R.	P
PE1	<---	Perc_Ease	1.000			
PE2	<---	Perc_Ease	1.053	.046	23.041	***
PE3	<---	Perc_Ease	1.172	.055	21.208	***
PE4	<---	Perc_Ease	1.094	.051	21.455	***
PE5	<---	Perc_Ease	1.015	.072	14.178	***
PE6	<---	Perc_Ease	1.035	.056	18.500	***

Regression Weights for SN Variable (before modification)

			Estimate	S.E.	C.R.	P
SN1	<---	Subj_Norm	1.000			
SN2	<---	Subj_Norm	1.047	.036	28.855	***
SN3	<---	Subj_Norm	.976	.052	18.625	***
SN4	<---	Subj_Norm	1.013	.047	21.661	***
SN5	<---	Subj_Norm	.832	.049	17.055	***
SN6	<---	Subj_Norm	.772	.053	14.639	***

Regression Weights for SN Variable (after modification)

			Estimate	S.E.	C.R.	P
SN1	<---	Subj_Norm	1.000			
SN2	<---	Subj_Norm	1.077	.032	33.245	***
SN3	<---	Subj_Norm	1.085	.069	15.703	***
SN4	<---	Subj_Norm	1.176	.065	18.223	***
SN5	<---	Subj_Norm	.933	.059	15.690	***
SN6	<---	Subj_Norm	.882	.062	14.149	***

Regression Weights for SE Variable (before modification)

			Estimate	S.E.	C.R.	P
SE1	<---	Self_Efficacy	1.000			
SE2	<---	Self_Efficacy	2.851	.614	4.645	***
SE3	<---	Self_Efficacy	4.046	.857	4.722	***
SE4	<---	Self_Efficacy	4.147	.881	4.708	***
SE5	<---	Self_Efficacy	2.641	.575	4.597	***
SE6	<---	Self_Efficacy	2.035	.468	4.350	***
SE7	<---	Self_Efficacy	2.120	.474	4.477	***

Regression Weights for SE Variable (after modification)

			Estimate	S.E.	C.R.	P
SE2	<---	Self_Efficacy	1.000			
SE3	<---	Self_Efficacy	1.483	.093	16.002	***
SE4	<---	Self_Efficacy	1.515	.095	15.988	***
SE5	<---	Self_Efficacy	.907	.073	12.414	***

Regression Weights for ME Variable (before modification)

			Estimate	S.E.	C.R.	P
ME1	<---	Mobile_Exp	1.000			
ME2	<---	Mobile_Exp	1.017	.050	20.191	***
ME3	<---	Mobile_Exp	.564	.036	15.566	***
ME4	<---	Mobile_Exp	.951	.048	20.013	***
ME5	<---	Mobile_Exp	.935	.080	11.624	***
ME6	<---	Mobile_Exp	.840	.044	19.275	***
ME7	<---	Mobile_Exp	1.034	.063	16.476	***

Regression Weights for ME Variable (after modification)

			Estimate	S.E.	C.R.	P
ME1	<---	Mobile_Exp	1.000			
ME2	<---	Mobile_Exp	.950	.048	19.889	***
ME3	<---	Mobile_Exp	.608	.041	14.847	***
ME4	<---	Mobile_Exp	1.032	.053	19.553	***
ME6	<---	Mobile_Exp	.881	.049	17.828	***
ME7	<---	Mobile_Exp	1.079	.070	15.359	***

Regression Weights for UC Variable (before modification)

			Estimate	S.E.	C.R.	P
UC1	<---	Univ_Culture	1.000			
UC2	<---	Univ_Culture	.972	.197	4.927	***
UC3	<---	Univ_Culture	1.705	.343	4.972	***
UC4	<---	Univ_Culture	1.101	.206	5.346	***
UC5	<---	Univ_Culture	2.441	.396	6.161	***
UC6	<---	Univ_Culture	2.421	.386	6.266	***
UC7	<---	Univ_Culture	2.433	.389	6.255	***
UC8	<---	Univ_Culture	1.775	.304	5.835	***
UC9	<---	Univ_Culture	1.661	.280	5.939	***

Regression Weights for UC Variable (after modification)

			Estimate	S.E.	C.R.	P
UC5	<---	Univ_Culture	1.572	.131	12.045	***
UC6	<---	Univ_Culture	1.574	.120	13.124	***
UC7	<---	Univ_Culture	1.609	.121	13.288	***
UC8	<---	Univ_Culture	1.053	.071	14.865	***
UC9	<---	Univ_Culture	1.000			

Appendix H
Measurement Model Analysis

Standardized Regression Weights (before modification)

			Estimate				Estimate
BI5	<---	BI	.926	SN4	<---	SN	.903
BI4	<---	BI	.938	SN3	<---	SN	.832
BI3	<---	BI	.955	SN2	<---	SN	.907
BI2	<---	BI	.924	SN1	<---	SN	.883
BI1	<---	BI	.921	SE1	<---	SE	.277
PE6	<---	PE	.861	SE2	<---	SE	.725
PE5	<---	PE	.714	SE3	<---	SE	.932
PE4	<---	PE	.936	SE4	<---	SE	.926
PE3	<---	PE	.931	SE5	<---	SE	.677
PE2	<---	PE	.895	SE6	<---	SE	.493
PE1	<---	PE	.828	ME1	<---	ME	.889
PU1	<---	PU	.934	ME2	<---	ME	.823
PU2	<---	PU	.958	ME3	<---	ME	.718
PU3	<---	PU	.975	ME4	<---	ME	.828
PU4	<---	PU	.945	ME5	<---	ME	.580
PU5	<---	PU	.892	ME6	<---	ME	.813
SN6	<---	SN	.721	ME7	<---	ME	.743
SN5	<---	SN	.772	SE7	<---	SE	.568

Standardized Regression Weights (after modification)

			Estimate				Estimate
BI5	<---	BI	.896	SN6	<---	SN	.728
BI4	<---	BI	.913	SN5	<---	SN	.768
BI3	<---	BI	.965	SN4	<---	SN	.926
BI2	<---	BI	.937	SN3	<---	SN	.832
BI1	<---	BI	.928	SN2	<---	SN	.853
PE6	<---	PE	.853	SN1	<---	SN	.815
PE5	<---	PE	.697	SE2	<---	SE	.707
PE4	<---	PE	.938	SE3	<---	SE	.947
PE3	<---	PE	.932	SE4	<---	SE	.934
PE2	<---	PE	.897	SE5	<---	SE	.647
PE1	<---	PE	.827	ME1	<---	ME	.895
PU1	<---	PU	.921	ME2	<---	ME	.822
PU2	<---	PU	.949	ME3	<---	ME	.717
PU3	<---	PU	.977	ME4	<---	ME	.829
PU4	<---	PU	.950	ME6	<---	ME	.811
PU5	<---	PU	.895	ME7	<---	ME	.734

Covariances

			M.I.	Par Change
e36	<-->	BI	14.923	.135
e35	<-->	SE	4.004	.024
e34	<-->	e36	11.857	.236
e32	<-->	SN	8.266	-.069
e32	<-->	PE	4.769	.046
e32	<-->	BI	4.906	-.045
e32	<-->	e36	21.767	-.136
e32	<-->	e35	18.584	.083
e32	<-->	e33	7.704	.058
e31	<-->	e36	7.846	.109
e31	<-->	e35	10.523	-.083
e31	<-->	e33	11.566	-.094
e30	<-->	e36	6.581	-.078
e30	<-->	e31	20.539	.106
e29	<-->	ME	8.928	.151
e29	<-->	BI	5.576	.094
e28	<-->	BI	7.296	.125
e28	<-->	e36	14.335	.251
e28	<-->	e34	9.753	.284
e28	<-->	e32	11.456	-.131
e28	<-->	e31	6.462	.132
e28	<-->	e29	35.991	.453
e27	<-->	e29	60.773	.474
e26	<-->	ME	8.522	-.098
e26	<-->	e29	9.482	-.131
e26	<-->	e28	4.722	-.108
e26	<-->	e27	6.272	-.100
e25	<-->	e35	4.141	.049
e25	<-->	e31	4.635	-.061
e25	<-->	e29	19.951	-.183
e25	<-->	e28	11.227	-.160
e25	<-->	e27	7.506	-.105
e25	<-->	e26	21.915	.109
e24	<-->	ME	12.599	.159
e24	<-->	e27	5.289	.124
e23	<-->	ME	20.847	.268
e23	<-->	SE	7.426	-.064
e23	<-->	PE	12.747	.171
e23	<-->	e36	7.661	.183
e23	<-->	e34	5.315	.209
e23	<-->	e29	34.038	.440
e23	<-->	e28	62.360	.693
e23	<-->	e27	10.982	.235
e23	<-->	e26	39.910	-.315
e23	<-->	e25	12.988	-.173
e23	<-->	e24	27.493	.351
e22	<-->	PE	4.338	-.057

			M.I.	Par Change
e16	<-->	e23	4.624	.094
e15	<-->	SN	6.495	-.050
e15	<-->	PU	4.930	-.032
e15	<-->	BI	11.171	.056
e15	<-->	e36	6.456	-.061
e15	<-->	e35	5.820	.038
e15	<-->	e31	6.012	-.046
e15	<-->	e23	5.529	-.075
e15	<-->	e16	11.869	.054
e14	<-->	e15	5.164	.020
e13	<-->	BI	4.007	-.031
e13	<-->	e18	8.741	-.062
e13	<-->	e16	9.181	-.044
e12	<-->	e35	7.311	-.047
e12	<-->	e30	6.081	.040
e12	<-->	e17	9.729	-.084
e12	<-->	e15	30.958	-.069
e12	<-->	e13	43.776	.076
e11	<-->	PU	4.587	.045
e11	<-->	PE	8.699	-.075
e11	<-->	e17	4.779	-.079
e11	<-->	e12	6.593	.047
e10	<-->	e32	4.063	.033
e10	<-->	e28	5.300	-.085
e10	<-->	e24	5.702	.067
e10	<-->	e19	6.942	-.054
e10	<-->	e15	4.785	.029
e10	<-->	e11	18.221	.083
e9	<-->	e21	4.195	.037
e9	<-->	e11	13.084	-.063
e8	<-->	e9	10.336	.035
e7	<-->	ME	4.709	-.096
e7	<-->	SE	8.864	.053
e7	<-->	e28	6.081	.163
e7	<-->	e17	13.698	.189
e7	<-->	e10	9.703	-.086
e6	<-->	e35	7.080	-.056
e6	<-->	e28	6.542	.107
e6	<-->	e23	4.063	.084
e6	<-->	e21	8.415	-.065
e6	<-->	e7	28.655	.167
e5	<-->	e35	5.008	-.047
e5	<-->	e31	4.304	.051
e5	<-->	e12	4.296	.034
e5	<-->	e8	6.634	-.037
e5	<-->	e6	12.760	.071
e4	<-->	e35	5.306	-.045

			M.I.	Par Change
e22	<-->	BI	4.366	-.055
e21	<-->	SE	6.042	-.031
e21	<-->	SN	4.647	.062
e21	<-->	e22	147.593	.316
e20	<-->	ME	5.136	.093
e20	<-->	SN	4.907	-.084
e20	<-->	e30	5.653	.068
e20	<-->	e22	5.636	-.082
e20	<-->	e21	19.678	-.144
e19	<-->	e35	4.461	-.051
e19	<-->	e28	8.325	.140
e19	<-->	e22	30.764	-.148
e19	<-->	e21	8.856	-.075
e19	<-->	e20	57.782	.254
e18	<-->	PU	10.432	-.092
e18	<-->	PE	7.657	.095
e18	<-->	e36	5.438	.110
e18	<-->	e27	4.671	.109
e18	<-->	e22	7.046	-.094
e18	<-->	e20	5.961	-.107
e17	<-->	SE	11.322	.062
e17	<-->	PE	15.073	.144
e17	<-->	e34	5.247	.162
e17	<-->	e27	11.168	.184
e17	<-->	e24	6.814	.136
e17	<-->	e22	21.051	-.176
e17	<-->	e21	17.277	-.151
e17	<-->	e19	6.277	.094
e17	<-->	e18	89.866	.460
e16	<-->	PE	9.294	.073
e16	<-->	e34	5.443	-.106
e16	<-->	e31	5.452	-.060

			M.I.	Par Change
e4	<-->	e31	8.995	.069
e4	<-->	e12	6.475	.039
e4	<-->	e10	4.386	-.034
e4	<-->	e5	11.312	.062
e3	<-->	PU	7.858	-.043
e3	<-->	e30	25.799	.080
e3	<-->	e29	5.465	.068
e3	<-->	e5	11.230	.053
e3	<-->	e4	27.615	.077
e2	<-->	e35	4.588	.041
e2	<-->	e30	6.215	-.045
e2	<-->	e22	7.816	-.061
e2	<-->	e12	7.830	-.043
e2	<-->	e6	8.069	-.052
e2	<-->	e5	17.390	-.075
e2	<-->	e4	18.710	-.072
e2	<-->	e3	5.114	-.032
e1	<-->	ME	5.513	-.064
e1	<-->	PU	5.462	.043
e1	<-->	e35	4.676	.044
e1	<-->	e34	6.107	.105
e1	<-->	e30	8.005	-.054
e1	<-->	e15	4.150	.030
e1	<-->	e14	6.136	.029
e1	<-->	e12	10.319	-.052
e1	<-->	e9	4.253	.032
e1	<-->	e6	7.404	-.053
e1	<-->	e5	6.551	-.049
e1	<-->	e4	32.429	-.102
e1	<-->	e3	18.474	-.066
e1	<-->	e2	118.896	.191

Appendix I
Model Fit Analysis

Model Fit Summary (before modification)

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	87	2060.240	579	.000	3.558
Saturated model	666	.000	0		
Independence model	36	13875.293	630	.000	22.024

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.185	.733	.693	.637
Saturated model	.000	1.000		
Independence model	.751	.127	.077	.120

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.852	.838	.889	.878	.888
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.919	.783	.816
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.087	.083	.091	.000
Independence model	.250	.247	.254	.000

Model Fit Summary (after modification)

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	85	958.604	443	.000	2.164
Saturated model	528	.000	0		
Independence model	32	12947.194	496	.000	26.103

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.097	.852	.823	.714
Saturated model	.000	1.000		
Independence model	.786	.128	.072	.120

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.926	.917	.959	.954	.959
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.893	.827	.856
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.054	.064	.002
Independence model	.273	.269	.277	.000

Appendix J
Structural Model Analysis

Regression Weights

			Estimate	S.E.	C.R.	P
PE	<---	SN	.401	.053	7.509	***
PE	<---	SE	-.171	.050	-3.437	***
PE	<---	ME	.450	.049	9.129	***
PU	<---	SN	.421	.065	6.445	***
PU	<---	SE	.067	.055	1.224	.221
PU	<---	ME	.185	.060	3.079	.002
PU	<---	PE	.532	.072	7.431	***
BI	<---	PE	.031	.055	.575	.565
BI	<---	PU	.917	.053	17.353	***

Squared Multiple Correlations

	Estimate
PE	.443
PU	.573
BI	.774

Appendix K
Mediating Analysis

Regression Weights (without mediator)

			Estimate	S.E.	C.R.	P
BI	<---	SN	.681	.075	9.069	***
BI	<---	SE	-.054	.064	-.838	.402
BI	<---	ME	.404	.062	6.524	***

Standardized Direct Effects

	ME	SE	SN	PU	PE	BI
PU	.358	-.033	.537	.000	.000	.000
PE	.476	-.186	.448	.000	.000	.000
BI	.042	-.027	.128	.788	-.007	.000

Standardized Indirect Effects

	ME	SE	SN	PU	PE	BI
PU	.000	.000	.000	.000	.000	.000
PE	.000	.000	.000	.000	.000	.000
BI	.279	-.025	.420	.000	.000	.000

Standardized Total Effects

	ME	SE	SN	PU	PE	BI
PU	.358	-.033	.537	.000	.000	.000
PE	.476	-.186	.448	.000	.000	.000
BI	.321	-.052	.548	.788	-.007	.000

Appendix L
Moderator Analysis

Age (Unconstrained)

Age (Constrained on PU) *Age (Constrained on PE)*

Gender (Unconstrained)

Gender (Constrained on PU) *Gender (Constrained on PE)*

University Culture (Unconstrained)

University Culture (Constrained on PU) *University Culture (Constrained on PE)*

Appendix M
Measurement Items Analysis

Means and standard deviations for measurement items

Items	N	Mean	Std. Deviation
UC1	337	5.69	1.203
UC2	337	5.91	1.021
UC3	337	5.62	1.745
UC4	337	6.21	.951
UC5	337	5.79	1.234
UC6	337	5.88	1.078
UC7	337	5.92	1.079
UC8	337	5.75	1.168
UC9	337	5.84	1.024
BI1	337	5.30	1.436
BI2	337	5.38	1.360
BI3	337	5.32	1.419
BI4	337	5.27	1.448
BI5	337	5.25	1.442
PU1	337	5.08	1.323
PU2	337	5.14	1.326
PU3	337	5.15	1.320
PU4	337	5.28	1.292
PU5	337	5.24	1.351
PE1	337	5.42	1.150
PE2	337	5.62	1.098
PE3	337	5.52	1.150
PE4	337	5.63	1.070
PE5	337	5.20	1.335
PE6	337	5.51	1.118
SN1	337	4.29	1.388
SN2	337	4.33	1.416
SN3	337	4.68	1.509
SN4	337	4.40	1.436
SN5	337	4.34	1.371
SN6	337	4.26	1.381
SE1	337	5.32	1.318
SE2	337	5.26	1.363
SE3	337	5.13	1.491
SE4	337	5.00	1.530
SE5	337	5.36	1.358
SE6	337	4.74	1.447
SE7	337	5.39	1.307
ME1	337	6.13	1.112
ME2	337	6.09	1.219
ME3	337	6.43	.776
ME4	337	6.12	1.129
ME5	337	5.67	1.587
ME6	337	6.26	1.016
ME7	337	5.86	1.371
Valid N (listwise)	337		