AN EXTENDED UTAUT MODEL OF FACTORS AFFECTING MALAYSIAN UNDERGRADUTES' ICT SKILLS

AYAD A YASS

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA
KUALA LUMPUR

2018

AN EXTENDED UTAUT MODEL OF FACTORS AFFECTING MALAYSIAN UNDERGRADUTES' ICT SKILLS

AYAD A YASS

THESIS SUBMITTED IN FULLFILMENT OF THE REQUIREMNTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA
KUALA LUMPUR

2018

UNIVERSITY OF MALAYA

ORIGINAL LITERARY WORK DECLARATION

Name of Candidate: Ayad A Yass

Matric No: WHA100048

Name of Degree: Doctor of Philosophy

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"): An Extended UTAUT Model of Factors Affecting Malaysian Undergraduates' ICT Skills

Field of Study: Computer Science (Management information System)

I do solemnly and sincerely declare that:

(1) I am the sole author/writer of this Work;
(2) This Work is original;
(3) Any use of any work in which copyright exists was done by way of fair dealing and for permitted purposes and any excerpt or extract from, or reference to or reproduction of any copyright work has been disclosed expressly and sufficiently and the title of the Work and its authorship have been acknowledged in this Work;
(4) I do not have any actual knowledge nor do I ought reasonably to know that the making of this work constitutes an infringement of any copyright work;
(5) I hereby assign all and every rights in the copyright to this Work to the University of Malaya ("UM"), who henceforth shall be owner of the copyright in this Work and that any reproduction or use in any form or by any means whatsoever is prohibited without the written consent of UM having been first had and obtained;
(6) I am fully aware that if in the course of making this Work I have infringed any copyright whether intentionally or otherwise, I may be subject to legal action or any other action as may be determined by UM.

Candidate's Signature Date:

Subscribed and solemnly declared before,

Witness's Signature Date:

Name:

Designation:

AN EXTENDED UTAUT MODEL OF FACTORS AFFECTING MALAYSIAN UNDERGRADUTES' ICT SKILLS

ABSTRACT

Information and Communication Technology has become one of the fundamental skill that higher education institution students need to acquire and grasp in preparation for future employment. Although ICT has been the most dominant ubiquitously in people life nowadays; the student's ICT skills penetration has been relatively low. The purpose of this correlational quantitative study is to explore the factors affecting and effecting student's ICT skills. The constructs used to develop the web-based survey for this study were derived from the Unified Theory of Acceptance and Use of Technology extended model. Data were collected by sending e-mails to a random sample of 504 students for 18 public universities in Malaysia. The structured equation modeling technique was used to assess correlations between the extended Unified theory of acceptance and use of technology constructs as the independent variables (also known as the exogenous factors) with intention to use ICT as the dependent variable. The findings of this study indicated that attitude, anxiety, effort expectancy and facilitating condition are the significant factors affecting High educational institute students' ICT skills in Malaysia. A framework is develop based on the result of the research hypothesis. The purpose of developing this framework is to identify significant factors affecting student's ICT skills and also as a guide future empirical research into the differences affect and effect factors in HEI students' ICT skills. The findings of this research suggests useful insight to the HEI to provide useful recommendation to facilitate procedures to improve the factors that affect and effect ICT skill of students in HEI.

Keywords: ICT, ICT competency, Structural Equation Modelling, ICT Acceptance, UTAUT.

MODEL UTAUT LANJUTAN BAGI FACTOR YANG MEMPENGARUHI KEMAHIRAN ICT MAHASISWA MALAYSIA

ABSTRAK

Teknologi maklumat dan komunikasi (ICT) telah menjadi salah satu kemahiran asas yang pelajar institusi pendidikan tinggi (IPT) perlu capai dan kuasai sebagai persediaan untuk pekerjaan di masa hadapan. Walaupun ICT telah menjadi yang paling sentiasa ada dominan dalam kehidupan orang-orang pada masa kini namun penembusan kemahiran ICT masih rendah. Tujuan kajian kuantitatif korelasi ini adalah untuk meneroka faktor-faktor yang mempengaruhi kemahiran ICT pelajar. Konstruk-konstruk yang digunakan untuk membangunkan kajian berasaskan jaringan untuk kajian ini diperoleh daripada Model Bersepadu Penerimaan dan Penggunaan Teknologi (UTAUT) dilanjutkan oleh menambah pembolehubah luaran. Data dikumpulkan melalui penghantaran e-mel kepada sampel rawak 504 pelajar di pelbagai universiti di Malaysia. Teknik struktur pemodelan persamaan (SEM) telah digunakan untuk menilai hubung kait kolerasi antara konstruk-konstruk UTAUT lanjutan pembolehubah bebas dengan niat untuk menggunakan ICT pembolehubah bersandar. Hasil kajian menunjukkan bahawa sikap, kebimbangan, segala pengharapan dan keadaan kemudahan adalah faktor-faktor bererti mempengaruhi kemahiran ICT pelajar-pelajar institusi pendidikan tinggi (IPT) di Malaysia. Satu model ramalan dibangunkan berdasarkan keputusan hipotesis kajian. Tujuan pembangunan model ramalan ini ialah untuk mengenalpasti faktor-faktor signifikan yang mempengaruhi kemahiran ICT pelajar dan juga sebagai panduan penyelidikan empirical masa hadapan ke dalam perbezaan-perbezaan faktor-faktor pengaruh dan kesan ke atas pelajar. Hasil kajian ini memberikan wawasan yang berguna kepada institusi pendidikan tinggi (IPT) untuk membuat syor untuk prosedur membantu membaiki faktor-faktor yang mempengaruhi dan memberi kesan terhadap kemahiran ICT pelajar. Tujuan kajian

kuantitatif korelasi ini adalah untuk meneroka faktor-faktor yang mempengaruhi kemahiran ICT pelajar.

ACKNOWLEDGEMENTS

Alhamdulillah, praise be to Allah s.w.t for giving me the strength and determination to complete this study. With His blessing, finally, I am able to finish my study and complete my thesis successfully. First and foremost, my sincere gratitude goes to my supervisor, Dr. Norizan Mohd Yasin for her extended supervision, encouragement, brilliant ideas and insightful comments that enables me to complete this study. This work might not be possible without the support and encouragement from her. Her guidance helped me in all the time of research and writing of this thesis. Next, my deepest appreciation goes to my father, my mother, and beloved siblings for their never ending prayers, encouragement, support, care and understanding, that made it possible for me to finish this work. Only Allah knows how much I appreciate that. Last, but not least, I would like to take this opportunity to say thank you to all my friends for their moral support and all the people that have helped me, directly or indirectly, in completing this research. May Allah s.w.t bless all of you. With love, I dedicate this thesis to all of you. Thank you.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF SYMBOLS AND ABBREVIATIONS

ICT	:	Information and Communication Technology
UTAUT	:	Unify Theory of Acceptance and Use of Technology
TAM	:	Technology Acceptance Model
ICDL	:	International Computer Driving License
ECDL	:	Europe Computer driving license
EE	:	Effort Expectancy
PE	:	Performance expectancy
SI	:	Social influence
BI	:	Behavioral Intentions
BU	:	Behavior Use
CA	:	Cronbach Alpha
HEI	:	Higher Education Institution
EUT	:	Educational Technology
SCT	:	Social Cognitive Theory
HIS	:	Health Information System
CSE	:	Computer self-efficacy
CAI	:	Computer Assisted Instruction
TPB	:	Theory of Planned Behavior
TRA	:	Theory of Reasoned Action
AU	:	Actual Use
SCT	:	Social Cognitive Theory
MM	:	Motivation Model
IDT	:	Innovation Diffusion Theory

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter introduces the direction of this research study beginning with background about the research, followed with the problem statement of the research, the research objectives and research questions. In detail this Chapter 1 in Section 1.2 presents the background of the research followed by the purpose of the study in Section 1.3, the problem statement of the research study that has been identified in Section 1.4 while Section 1.5 dictates the research objectives for the study, the research questions is presented in Section 1.6 followed by the research hypothesis in Section 1.7 and the significant of the study in Section 1.8 and Section 1.9 highlights the limitation and scope of the study conducted. Finally, Section 1.10 presents the outline the main structure of the whole thesis.

1.2 Research Background

Information and Communication Technology (ICT) has now become an inevitable economic development requirement in order to sustain the economic growth of a country as we now live in a revolutionized advancement of digital technology (Rahman et al., 2009). ICT and science skills have been perceived by many governments as important factors for economic growth and development in the 21st century (Freeman, 2011). Drastic achievement in IT has completely changed the world so as to the basic education future requirements (Altun et al. 2010).

ICT has now become an essential part of the economy and there has been an increasing trend in ICT investments in many countries throughout the world over the last two decades (Campisi et al., 2013). In today's globalization era, ICTs helped to developed

countries by providing opportunities for economic development, minimizing poverty while improving basic healthcare and education (Florencia, 2010). On the other hand, ICTs and the Internet can provide education, learning and training opportunities that can increase skill levels of workers at a lower cost.

ICT today has become among the important fundamental skills that higher education institutions (HEIs) students need to acquire and grasp in preparation for future employment (Dasuki & Pamela, 2015). Being able to use computer and Internet effectively, having a qualified education, getting a job and communication skills became prerequisites for human life quality (Altun et al. 2010). ICT in higher education institutions (HEI) will help the student to increase their knowledge of subjects being taught in schools, improved learning attitude and motivation where the development of these new skills are much needed for a country to develop its nation and economy.

Despite stagnating economic growth and high unemployment rates, the demand for ICT jobs in Europe is continuously growing researchers estimated that in 2015 about 509,000 vacancies for ICT jobs will not be filled due to lack of suitable candidates and this figure might increase to 1 million in 2020 (Gareis et al., 2014). Lack of skilled workers, often referred as ICT skills issue remains one of the reasons that skills in area such as science, technology, and engineering needs to be strengthened so that the career image of these fields can be improved. Thus, because of the high requirements and importance of the ICT, there has been many attempts and initiatives done by many parties. Therefore, there is a need to identify the factors that are affecting students to have the necessary ICT skills (Yasin, 2011). By able to identify the factors affecting student's ICT skill it will help to unearth the reasons hence giving a better understanding why students are not having the required ICT skills.

Having the correct knowledge and skills make the undergraduates to become knowledge and competent workers contributing toward the society. Hence these potential employees can carry their job effectively by equipping themselves with the relevant and needed knowledge, appropriate skills and positive attitudes and whilst using up-to-date ICT technology. Champa (2014) had identified that inability to achieve the required level of competency in ICT can become a key factor for unemployment in this 21st century.

1.3 Purpose of the Study

ICT has become a basic requirement entry skill and very essential for employment (Atasoy, 2012). Industries now are demanding potential employees having the required ICT competency and possess other employability skills such communication skills in addition to meet the required academic qualification as to be able to fully contribute themselves with the variety of positions in an organization (Florencia, 2010). Hanadi et al (2011) defined ICT as skills related activities which include ability to use computer, software applications, including databases and other related technologies for personal use such as academic purpose or work-related.

Graduates who posed a good experience in his specialist but not armored by ICT skills will be ranked as low quality (Calitz et al., 2014). ICT today has become among the important fundamental skills that higher education institution (HEI) students need to acquire and grasp in preparation for future employment (Fairlie, 2012). Despite the deep penetration of ICT in people's lives, the level of ICT skills still seems as in immaturity but with great potential for growth in the future.

Contemporary economic theory is compatible with technological innovations being generally beneficial for most workers (Michele, 2015). According to Katz (2008) and Michele (2015) technological change is often skill-biased in the sense that increase in the

relative demand for skill become quantitatively associated with technological advances raising productivity.

In Malaysia and in many other countries the developments in electronic information resources have led to the demand for employees with ICT skills especially in information handling institutions; therefore, there is a need to prepare the students for this workplace (Buarki et al., 2011). Students having a basic ICT skill is associated with 20 to 30 percent higher probability of being employed (Atasoy, 2012). Unfortunately, graduates in Malaysia are facing unemployment issue in the job market due to lack of ICT skills (Yasin 2011). Malaysian government initiatives have increased the demand for IT workers but although the demand for skilled ICT graduates is very high but graduates do not meet the skill requirements (Suhaimi et al., 2012; Ahlan et al., 2008). In terms of entry-level monthly average salary scales, the ICT industry is consistently ranked as one of the top five amongst twenty-five industries (Sien et al., 2014).

In general, ICT skills and computer skills are same, both of them referring to the ability of using computer and software application such as Microsoft word, Facility with spreadsheet programs especially Microsoft Excel, PowerPoint, Microsoft Access and other computer application (Verhoeven et al., 2016). However, this research focuses particularly on the ICT skills in general as to fill the gap of the lack of studies conducted on the ICT skills in general and the factors affecting student's ICT skills. Hence, this research is an attempt to mend the gap in the current literature by scrutinizing the factors that affect the students' ICT skills in Malaysia. This research then proposed a framework to identify the factors affecting the students' ICT skills by using extended UTAUT model.

This research focuses on ICT skills that is defined as using digital technology, communication tools and networks in acquiring knowledge and information, communication and performing practical tasks. This research attempts to identify factors

affecting the student's ICT skill and then proceed to do a framework based on these factors. The framework helps in identifying independent variables, dependent variable as well as moderating variables. These variables are also known as factors and will be used interchangeably in this research. In the Oxford dictionary affecting is defined as having an effect on or make a difference to while effecting is defined as a change which is a result or consequence of an action or other cause. Though there is a slight difference in the meaning of affecting and effecting, this research uses the word affecting and effecting interchangeably.

1.4 Problem Statement

ICT has become a basic requirement entry skill and very essential for employment (Atasoy, 2012). Industries now actually are demanding potential employees having the required candidates that posed both ICT competency. Graduates who posed a good experience in his specialist but not armored by ICT skills will be ranked as low quality as ICT today has become among the important fundamental skills for future employment (Calitz et al., 2014).

Though there have been many studies done on predictive analysis such as in e-learning, e-governments, mobile baking, and educations (Yahya et al., 2012; Yvonne, 2010) yet only few studies were done to predict ICT skills among students. According to Salman et al., (2014) there have only been few researches looking at ICT skills and the factors affecting students' ICT. This research attempted to develop a framework of analysis on ICT skills by identifying the independent factor and independent factors.

Hence, predicting the factors affecting student's ICT skills is important to understand the reasons of students not having the right ICT skills as it potentially helps to minimize the graduate employment issue due to not having the required ICT skills.

Industry is an important contributor to growth almost every economy and ICT one of those contributors. ICT sectors consider one of the important factors that support the economic growth. With the penetration of information technology into every walk of business, computer skills become increasingly valued in today's workplaces. While studies have revealed that computer skills can improve productivity, solve complex problems, create new businesses, and earn wage premium, few studies have investigated the role computer skills can potentially play for worker employment (Peng, 2017). Acording to Raman (2015), ICT skills play role in enhancing work life balance amongst employees in the Malaysian ICT sector. ICT skills have high percentage within the skills requirements.

1.5 Research Objectives

This research main aim is to build a framework to predict the factors that are affecting the students' ICT skills. This is done by investigating the factors that affect the student ICT skills. Firstly, in doing so, the factors affecting the ICT skills will have to be identified. Secondly, there is a need to determine the effect of these factors towards the students' ICT skills. Finally, a framework is developed where it is able to predict the factors that affects on the students' ICT skills.

Based on the above, the following are the research objectives:

1- To identify the factors affecting the students' ICT skills.
2- To determine the impact of these factors students' ICT skills.
3- To develop a framework based on the factors that affect students' ICT skills identified earlier.

1.6 Research Questions

The researcher will attempt to answer the following questions:

1- What are the factors affecting students' ICT skills?

2- What impact has these factors and their moderating variables on the students' ICT skills?

3- How would the framework be developed based on the identified factors?

Table 1.1: Mapping the Research Objectives with the Research Questions

	Research Objective	Research Question
Obj1	1- To identify the factors affecting the students' ICT skills.	1- What are the factors affecting the students' ICT skills?
Obj2	2- To determine the impact of these factors and their moderator variables on the students' ICT skills.	2- What impact has these factors and their moderating variables on the students' ICT skills?
Obj3	3- To develop a framework based on the factors that affect– students' ICT skills identified earlier.	3- How would the framework be developed based on the identified factors?

1.7 Research Hypothesis

A hypothesis is a statement tentatively predicting variables particular relationship. This research investigates the factors that has been mentioned in prior researches that affect students' ICT skill which include attitude (Chwee, 2010), behavior intention(Catarina, 2012), anxiety (Karuri et al., 2013) and (Tsai, 2011), availability of time (Ndinoshiho, 2010), performance expectancy (Alqatawnah, 2012 & Zhan, 2011), gender (Evwiekpaefe, 2011), age (Philip, 2009), performance expectancy and behavior intention (Cha et al., 2011; Ling et al., 2011), effort expectancy (Ahmad & Steve, 2013; Alshehri et al., 2013; Evwiekpaefe, 2011; Timothy, 2011), experience (Bassam, 2013) and social influence (Hana, 2011).

These factors then became the variables that are used to construct the research hypothesis. The hypothesis of the original UTAUT model proposed that the relationship between independent and dependent variables is normally moderated by demography factors and this research hypnotized that there is a relationship between these two variables. The proposed hypothesis for this research examines first the existing relationships between the variables mentioned above and then examines the effect of the moderators towards the relationship. This research added new constructs to the existing UTAUT model which includes the psychological factors, availability of time and the moderator ICT competency where hypotheses has been developed for this research to examine these new constructs. Table 1.2 presents the research hypotheses for this research. The following presents the research hypothesis:

Table 1.2: Research Hypothesis

No.	Hypothesis	Justification	References
H_1	Attitude positively influence the behavior intention of students to learn ICT skills.	This study explained the intention of students to use technology where attitude toward technology use was identified as a significant predictor. Student's behavior intention significantly predicted by attitude. Intention to use new technology influenced positively by attitude.	(Chwee, 2010) (Lee, 2010)
H_2	ICT competency positively moderate the relation between attitude and behavior intention of students to learn ICT.	Most users in education environment have positive attitude and are competent user of basic ICT tools. Additionally, according to the study of developing ICT Competency for Thai Teachers, the findings indicate that the ICT competence moderate the attitude.	(Balogun, 2011) (Catarina, 2012) (Akarawang et al., 2016)
H_3	Anxiety positively influence the behavior intention of students to learn ICT skills.	Intention to use and actual use of HIS identified anxiety as significant direct determinants while support from organizational self-efficacy as indirect determinants	(Karuri et al., 2013) (Tsai, 2011)
H_4	ICT competency positively moderate the relation between anxiety and behavior intention of students to learn ICT skills.	The study of undergraduate student's perception of E-Portal proves that computer competence could help to decrease the anxiety and vice versa. Furthermore, anxiety is one of the factors that affect the use of ICT in class which linked with computer competence.	(Yemisi, 2014) (David, 2013)

Table 1.2 Continued

No.	Hypothesis	Justification	References
H_5	Self-efficacy positively influence the behavior intention of students to learn ICT skills.	This study investigated the intention to use e-learning positive affected by self-efficacy	(Fisal, 2011) (Yvonne, 2010)
H_6	ICT competency positively moderate the relation between self-efficacy and behavior intention of students to learn ICT skills.	In this study, self-efficacy reflects confidence in the ability to exert control over one's own motivation; ICT competence will assist to increase the student's confidence to learn ICT skills. Besides, computer self-efficacy indicates to the user to think that they have the competence to use computers.	(Pessu, 2013) (Mnaathr et al., 2013)
H_7	Availability of time positively influence the behavior intention of students to learn ICT skills.	This study investigated time as affecting ICT skills factor.	(Ndinoshiho, 2010)
H_8	Performance expectancy positively influence the behavior intention to learn ICT skills.	Adapting performance expectancy relates to usefulness of ICT. Performance expectancy influences employees' behavioral intention, which then finally affects the user behavior.	(Alqatawnah, 2012) (Zhan, 2011)
H_9	Gender positively moderate the relationship between performance expectancy and behavior intention.	Earlier researches shown that there are many differences between man and woman (gender) when using ICT in term of the usefulness.	(Evwiekpaefe, 2011)

Table 1.2 Continued

No.	Hypothesis	Justification	Ref.
H_{10}	Age positively moderate the relationship between performance expectancy and behavior intention.	Elderly user age factor difficult to use and less useful when performing their task or assignments.	(Philip, 2009)
H_{11}	ICT competency positively moderate the relationship between performance expectancy and behavior intention.	ICT competency will raise the performance expectancy.	(Ling et al., 2011) (Cha et al., 2011)
H_{12}	Effort expectancy positively influence the behavior intention of student to learn ICT skills.	Effort expectation refers to ease of technology use considered as the determinant factor of the behavior intention to use the technology.	(Steve, 2013) (Alshehri et al., 2013) (Evwiekpaefe, 2011) (Timothy, 2011)
H_{13}	Gender positively moderate the relationship between effort expectancy and behavior intention of students to learn ICT skills.	Moderating factor gender affect effort expectancy on the behavior intention of students.	(Kumar, 2012)
H_{14}	Age positively moderate the relationship between effort expectancy and behavior intention of student to learn ICT skills.	Age factor where there exist difficulties to retrieve information and use ICT tools by elderly people.	(Ghalandari, 2012) (Evwiekpaefe, 2011)

Table 1.2 Continued

No.	Hypothesis	Justification	Ref.
H_{15}	Experience positively moderate the relationship between effort expectancy and behavior intention of student to learn ICT skills.	According to the study on acceptance of web-based training system, experience was found to affect on the relation between effort expectancy and the behavior intention.	(Bassam, 2013)
H_{16}	ICT competency positively moderate the relationship between effort expectancy and behavior intention of student to learn ICT skills.	A competent person is more likely to perform a job better with less effort than an incompetent person	(Song, 2011)
H_{17}	Social influence positively influence the behavior intention of student to learn ICT.	Social influence affects personal intention to use new technology	(Bakar et al., 2013) (Susanto, 2012) (Yahya et al., 2012)
H_{18}	Age positively moderate the relationship between social influence and behavior intention of student to learn ICT skills.	Female respondents easier influence compare to male in ICT use.	(Karjaluoto et al., 2010)

Table 1.2 Continued

No.	Hypothesis	Justification	Ref.
H_{19}	Gender positively moderate the relationship between social influence and behavior intention of student to learn ICT skills.	Gender affect positively on relationship between social influence and behavior intention of student to learn ICT skills. Age effect on social influence and behavior intention relationship	(Hu et al., 2010) (Wang et al., 2009)
H_{20}	Experience positively moderate the relationship between social influence and behavior intention of student to learn ICT skills.	Review study done on UTAUT indicated that experience affect on social influence and behavior intention.	(Williams et al., 2015)
H_{21}	Voluntary of use positively moderate the relationship between social influence and behavior intention of student to learn ICT skills.	Voluntary of use effect of social influence on the behavior use relationship	(Benny, 2015)
H_{22}	ICT competency positively moderate the relationship between social influence and behavior intention of student to learn ICT skills.	Earlier researched found that students showed more deference and conformity to parents with higher ICT competence.	(Miaoting et al., 2014)

Table 1.2 Continued

No.	Hypothesis	Justification	Ref.
H_{23}	Facilitating condition positively influence the behavior use of student to learn ICT skills.	Facilitating condition affect on the behavior use of student to learn ICT skills relationship	(Azlina et al., 2013) (Mamoun, 2013) (Sumak et al., 2010)
H_{24}	Age positively moderate the relationship between facilitating condition and the behavior use of ICT.	Facilitating conditions affect on moderator factor age and individual experience relationship	(Long, 2010)
H_{25}	Experience positively moderate the relationship between facilitating condition and the behavior use of ICT.	Greater experience can lead to greater familiarity with the technology and better knowledge structures to facilitate user learning, thus reducing user dependence on external support as shown in earlier researches.	(Venkatesh et al., 2012) (Long, 2010)
H_{26}	Behavior intention positively influence the behavior use of ICT.	Behavioral intentions affect on usage behavior	(Williams et al., 2015)

1.8 Research Method

This research employed quantitative research method. The method section of a quantitative study should describe how each objective of the study will be achieved. Provide enough detail to enable the reader can make an informed assessment of the methods being used to obtain results associated with the research problem. The research methodology chapter also covered the details of the activities that are targeted toward achieving the research objectives. the research method covered the study population and sampling, data collection and data analysis. Research methodology full described in Chapter 3.

1.9 Significant of the Study

Information and Communication Technologies (ICT) becoming the backboned providing important infrastructure vital for the economy of a country. Hence, students need to be equipped with ICT skills for visible employment looking to harness the economic and social potential of these technologies strategized by policy makers (Vladimir, 2002). For instance, ICT penetration can affect growth, fostering technology diffusion and innovation, enhancing the quality of decision-making by firms and households and increasing demand and reducing production costs which together raises the output level (Khuong, 2011). Thus, Information and Communication Technologies (ICTs) is driving innovation, labor productivity and global economic growth. ICT now considered as important economy enablers (Vladimir, 2002). For example, with the Internet at its core, the diffusion of ICT has initiated a profound transformation of the world into an information society (Khuong, 2011). Therefore, it is imperative to understand exactly what factors are affecting students' ICT skills (Moghaddam, 2013). Thus, identifying the factors that affect the student's ICT skills is crucial for future employment as corrective measure for improvement on ICT skills can be done. This study's outcome and findings can provide significant recommendation to HEIs to suggest

how to embed ICT skills within the curriculum in order to develop the ICT skill while at the same time preparing these students as good potential candidate for job vacancies in the industries. Furthermore, the findings of this research can be used as a reference for academic purposes in order to minimize the gap in existing ICT skills. The reliability of the framework increases the confidence of the HEIs in predicting the factors that could affect the student's ICT skills; thus given the opportunity by introduce measures to further enhance the ICT skills. In addition, the framework can assist in identifying and focus areas that can help the students to enhance their skills of ICT applications, such as in the way of delivering teaching and learning content, curriculum design and the training (Şimşek et al., 2010) (Taleb, 2012).

1.10 Scope and Limitations of the Study

In this research, a survey was done to identify factors affecting student's ICT skills. The survey was carried out among the undergraduate students in Malaysian universities; hence it cannot be generalized to all students, which makes it harder to be generalized to other universities around the world. Despite these limitations, the findings of the study are helpful in enhancing ICT skills for the Malaysian students. The outcome of this research provide good opportunities for other future research in understanding students' ICT skills.

1.11 Summary of Chapter

In summary, Chapter One has discussed the background of the study, problem statements, research objectives, research questions, hypothesis, significance of the study and scope of the study. In the following chapter we are going to look in details about the literature review relating to this research, such as prior studies conducted on ICT, ICT acceptance models and theories and the factors affecting the students' ICT skills.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature for the research. Review on prior researches done on students and the ICT skills, ICT acceptance models and theories and studies on factors affecting ICT skills. This literature review process helps to identify the research gap analysis. Figure 2.1 illustrates the literature review (LR) structure.

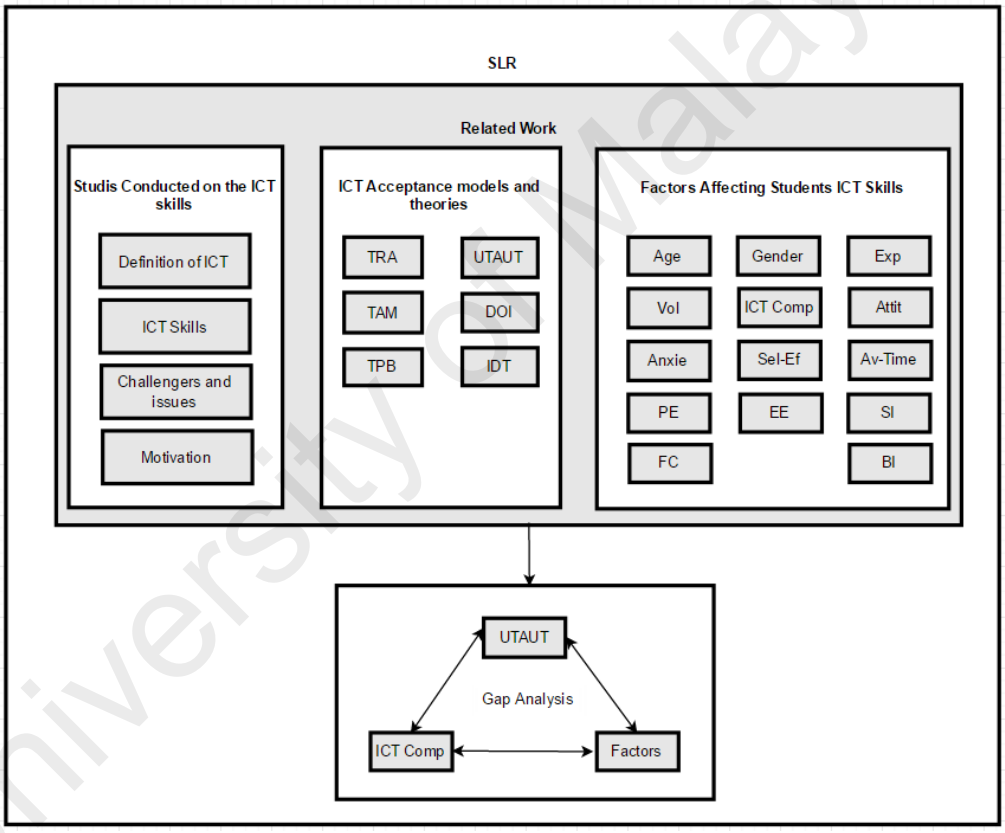

Figure 2.1: Literature Review (LR) Structure

2.2 Studies on ICT Skills

There is an enormous use of Information Communication Technology (ICT) in all spheres of human endeavor which is playing very significant roles in nations' development. The rapidly growing impact of ICT has brought about a revolutionary change in every facet of human life. Undoubtedly, the world is increasingly becoming an information society and heavily reliant on the use of ICT as a means of communication and transacting business (Alfred, 2014).

As can be predicted, the earliest and most research works on ICT area that aimed to show the importance and the acceptance of the ICT and its application. The easiest and largest category is the studies based on a focused topic. Examples of this include the studies related to specific ICT skills. There are numerous of studies conducted in the ICT fields. The study done by Wit et al. (2014) looked at whether openness to ICT helps to predict the ICT skills. Kuo et al. (2013) discussed the factors that motivates women in learning ICT. Peha (2013) attempted to find out if ICT in schools and how it affects residential adoption and adult utilization outside schools while Moghaddam (2013) looked at ICT adoption in rural area. Aesaert (2014) explored the factors related to primary school pupils' ICT self-efficacy. Abedalaziz et al. (2013); Rob Edmunds et al. (2012); John (2015); and Opoku (2014) studies focused on the users' attitude toward ICT (Klimova et al., 2016).

Studies done by Aesaert et al. (2015); Aesaert (2015); and Wit et al. (2012); Javier et al. (2017) were focused on the ICT competence while Faizah (2013); Mura & Diamantini (2014) and Irfan (2015) studied on the teacher's perception about the ICT use. Hakan & Akçayır (2014); Kate et al. (2015) studied on the PC tablet implementation and acceptance. The studies done by Gumus (2013) and Jara et al. (2015) helped to identify the factors affecting ICT skills where else the Verhoeven et al. (2014) looked at the ICT

learning and experience. In addition, Raman et al. (2015) & Salman et al. (2017) studied on the ICT acceptance and Althunibat (2015) studied the influencing students to use m-learning factor. Despite the varieties of the aforementioned studies done in different aspects of ICT fields there have been only few studies that specifically focused on students' ICT skills (Faizah, 2013; Irfan & Amat, 2015) especially using UTAUT model.

The findings of prior researches indicated that there is a multiplicity of reactions towards ICT use in general multiple disciplines; hence, having digital skills is seeming as important. The realization of ICT as a most viable tool for development has motivated countries to introduce ICT education at all levels of education. Countries have invested and continue to invest significantly in information technology including hardware, software and people ware (Alfred, 2014). Learning of ICT is seeming as very essential in the developing countries where computer education is relatively a recent phenomenon (Kante et al., 2016; Alfred, 2014).

2.2.1 Definitions of ICT

According to Zuppo (2012) Information and Communication Technologies (ICT) refers to technologies that provide access to information through telecommunications through the use of the Internet, wireless networks, cell phones, and other communication mediums. ICT industry includes the technology of managing and processing information in organizations (Njuguna, 2017; Tim, 2009). The ICT technology encompasses:

- The physical part of the computer (hardware: network equipment and personal computers)
- The nonphysical part of the computer (software applications and programs)
- The network and systems' data management and information.

ICT technology comprising of computer hardware and software, telecommunication tools and information networks allowed data and information to be transferred, processed, storage, organized, retrieved and used for problem solving and decision making, including teaching and learning (Abdullah, 2007). The hardware, computer and related software and Internet further enhance learning with availability of facilities such as email, home page, e-learning, e-teaching, and chatting (Evangelista, 2017).

Ever-increasing development of ICT in the world and dependence of other industries and activities on ICT industry today have led the increased in percentage of those people being connected (Coronado Mondragon et al., 2017). ICT brought vast changes in how business activities are being conducted, the manner of communication done with others, the protocol of how information is accessed and shared that generally touched all aspects of human life.

According to Aypay (2010) ICT enables distance learning as ICT enables communication and video conferencing and the use of relevant applications software. There has been various researches in ICT fields which include education, health care, libraries and other domains. ICT technology allowed for processing of information and communicating to take place all year round providing timely accurate information is as inputs for making good decisions, forecasting and predicting of the future; for example, forecasting the stock exchange market or detecting earth quakes and tsunami alarms (Sanga, 2016).

Communication is an act of transmitting messages (Arla et al., 2010). The way how communication process has changed from simply using simple symbols until the current technology utilizing Internet, e-mail or video conferencing allows the advantage to gain useful information and knowledge; hence enabling the learning process provided that the users have the required and needed ICT skills.

2.2.2 ICT Skills

Hanadi Buarki (2015) defined ICT skills as the skills needed to use and manipulate the computers to access and share information and knowledge and communicating to allow information and knowledge sharing while the Association of College and Research Libraries (ACRL), a division of the American Libraries Association (ALA) had also described in agreement with this definition of ICT skills.

According to Vitanova et al. (2015) basic ICT skills include creating class materials by using web resources, consumables, software, spreadsheets, multimedia presentations, blogs and databases. McKnight (2009) Sparks et al. (2016) stated that the least ICT skills that students need to have include manipulating of information (access and sharing), communicate information and to generate electronic by using the relevant application software. Employers are in favor for students who graduated having these ICT skills during their study or acquired from their previous experience while working or studying (Buarki et al., 2009; Okoye, 2018).

ICT skills include ability to use application software, Internet and Words tools like spell checker, spreadsheet and other application software like desktop publishing, authoring tools, and world wide web (WWW) (Hakkarainen et al., 2000), database and able to do some simple maintenance of the computer like installing of application software and virus check (Wit et al., 2012) and able to perform ICT related tasks facilitated when the access to the Internet is available (Falck et al. 2016).

ICT skills or IT skills competencies include digital knowledge needed necessary to manipulate and disseminate digital information (text, images, sounds) in any type of information and ICT skills in stand-alone software include a text processing programs (Pillai, 2014 ; Aesaert, 2014). ICT skills encompassed personal computer set up, know how to manipulate OS (operating system), able to use application system like Words to

produce text document, spreadsheet Excel, databases Access, create illustrations and slide or image presentations, computer network set and, Internet and communications. ICT skills also referred to able to use internet, computer, spreadsheet skills and word processing skills (Verhoeven et al. 2014), managing library systems (acquisition, catalogues, circulation and current awareness), maintaining databases, web pages, and the use of Web 2.0 technologies and social medias (Buarki, 2015). According to Luis et al. (2017) ICT skill requires the necessary knowledge as well as attitudes, abilities, strategies, and awareness when using ICT to do ICT task related and socializing. Basic ICT skills referring to storage and data transfer as well as the use of word processing and electronic spreadsheet applications while advanced ICT skills refer to graphics, animation, video and multimedia design and development using certain software and authoring tools (Irfan, 2014).

In brief, quality labor force is becoming critically important in the globalized environment and high technology nowadays. ICT has become a basic requirement entry skill and very essential for employment. Graduates who posed a good experience in his specialist but not armored by basic ICT skills will be ranked as lower quality. Industries now actually demanding candidates that posed both ICT and employability skills to fully contribute themselves among variety of positions (Stevens, 2016).

There may be some standard ways to assess ICT skills. In most prior researches ICT skills are assessed according to Program for the International Assessment of Adult Competencies (PIAAC) by measuring the extent to which a participant is capable of using modern information and communication tools to get along in a digital world. PIAAC an international assessment of the foundational information-processing skills required to participate in the social and economic life of advanced economies in the 21st century. PIAAC is an initiative of the Organization for Economic Co-operation and Development

(OECD). PIAAC provides a highly detailed survey of to assess the skills including literacy, numeracy and problem solving in technology-rich environments. The objective of this agency to assess and make comparison of competencies available including the ICT skills worldwide. The cognitive and skills at the workplace are the focus of PIAAC assessment.

However, this research used International Computer Driving License (ICDL) assessment to measure the students' ICT skills. The ICDL is chosen as the assessment fits the purpose to study the students' ICT against the industry and the employment needs. ICT competency describes more than awareness of the different level of license for services relating to computing and networking for different tasks (Champa, 2014). ICDL is an internationally recognized certificate that certifies practical skills in the most commonly used computer applications which meet current demands regarding digital knowledge and skills.

International Computer Driving License (ICDL) evolved from the European Computer Driving License (ECDL) which began as a project in 1995 to define the computer skills required by the ordinary citizen to take advantage of the new end user technology. ECDL has been certified by international panels of users and expert that the holder has the competencies required to perform basic tasks using a personal computer, can use a computer in practice and understands the basic concepts of information technology. ECDL as now known as ICDL has become the leading digital literacy certificate (Dolan, 2010; Gaith, 2016).

2.2.3 Challenges and Issues

Aesaert (2014) stated that contemporary information and knowledge society depends more and more on information technology; hence, people must possess a set of ICT competences and skills to cope with associated educational, social and economic

challenges. ICTs are becoming essential parts of the business investments and ICT skills that complement these technologies make the students more attractive on the job market (Atasoy, 2012).

ICT and Education

There are many challenges and issues in adopting ICT in various fields. Providing the technology is not enough just by ensuring the increase of digital education as there are many other factors having impact on the ability to successfully use of ICT in the classroom. Diamantini (2014) stated that the use of ICTs and digital skill levels are very uneven. For example, the study by Raman et al. (2015) found that though the blogs usage in education is in the early stages in many countries but it was also found that Edublogs has been integrated in their teaching and learning process by some other countries, especially the west.

Based on Kate et al. (2015) drastic trend changing of the technology has called for urgent investigation as it could add to social generation digital divide. ICT use differs among students. Being a frequent user of ICT contributed towards one being proficient and able to develop one ICT skills (Wit et al., 2014). Rural people are suffering from the widening digital gap (Moghaddam, 2013). There are also issues with the technology acceptance in higher education due to highest education earned, teaching experience, computer competency and prior computer experience (Peha, 2013). There are lack of ICT studies in done on the primary school.

All schools should have a computer system that allows teachers deliver their teaching and learning process via technology to making the teaching and learning process interesting and easy (Fančovičová, 2008; Sung et al., 2016). These goals are among the priority objectives for 2010 that the education and training systems of European countries

(EU) have set themselves in the follow-up to the Lisbon strategy. With this initiatives, it is hoped that new enrolled freshmen at university are able to developed the needed ICT skills and improve their frequentness of using computer and/or Internet with the advancement of ICT nowadays (Wit et al., 2012). However, while Verhoeven et al. (2010) explained that in spite of the ever-increasing number of applications for information and communications technology (ICT) in modern society, numerous studies showed that people still vary greatly with regard to their level of skills relating to ICT use and how often ICT is used.

Some government aimed to raise the standard and quality of education by encouraging the use of ICT in classrooms (Amat, 2015). There are various ICT initiatives that have been introduced in the education system but ICT integration in the classroom is yet to be fully investigated. Although application of technology in the classroom has been introduced for the last two decades, some teachers are still resistance to use technology in the classroom (Faizah, 2013).

Many education authorities are making due strategies to enhance ICT use in teaching and learning process knowing the important role of ICT in today's environment (Mehta, 2014). ICT enable the educational process of learning and teaching process to take place more effective and meaningful. The objective of strategizing ICT in education process helped to empowered the teaching and learning process itself.

There has been mentioning in prior research that ICT can be harmful towards current education process (Tondeur et al., 2007). The true fact that the vast rapid development of ICT need to be balance of with the need of improvement in the education system and this can be done by integrating ICT in the curriculum (Tondeur et al., 2016). Also, it is inevitable of the impact of Internet on the students; however, with careful planning and monitoring via regulations and policy one can harness the goodness of Internet. In

addition, with the availability of online games though it can contribute towards addiction (Vassilis, 2007; Mehta, 2014). However, with proper monitoring by the teachers and parents (Komis, 2007). The craving and addiction of these online game can be minimized and that it be used as recreational game. ICT has been approved a beneficial for students' future labor-market outcomes, even if the learning itself is not associated with better school grades (Falck et al., 2016). ICT skills were assessed in a computer-based mode, so some basic knowledge regarding the use of computers was required for student future workforce.

ICT and Gender

One of the critical factor in the ICT acceptance in education is attitude (Akçayır, 2014). There is a relation between attitude and gender towards ICT acceptance (Osman, 2014). Several studies had been conducted to look into what gender and socioeconomic status in relation to students' ICT competences (Braak, 2015). The study by Kuo et al. (2013) showed that women were still digitally illiterate.

ICT and Attitude

The adoption of ICT is different according to the demographic factors (Herlina, 2015). Prior researches stated that demographic factors such as age, gender and education level determined ICT use. Jara et al. (2015) mentioned in his study that for the new generations to fully integrate and participate in an increasingly technology-rich society they must become digitally literate as Gumus (2013) explained that having a basic computer competency has become an important prerequisite for finding a good job in almost every field. In addition, having the right attitude for IT contributes towards the benefit (Ramazani, 2012) of the economic and nation. For example, in any profession a complex decision-making process can be made easier and faster with the ability to get the correct and relevant information by having the necessary ICT skills.

ICT and Economy

Knowledge worker helps to build a nation. For example, according to Yasin (2011) in order for Malaysia to be an industrialized and service oriented economy nation by year 2020 Malaysia requires a labor force with new skill geared to knowledge based economy. As we enter the 21st century, there has been many discussions about the type of skills needed to acquire to survive and flourish in this century. ICT always changes with rapid advances in technology; shifting job descriptions and affects job success. The ICT graduates should possess the required skills and training by their HEIs as upon graduating to be able to acquire the job as well as for continuing the career path as a professional. Education is the driving force of a country's development.

Additionally, acquisition of ICTs skills can boost the inclusion of marginalized groups. Having the needed ICT skills helps into employability. In some situations, people are not employed because they do not have the needed skill. In the era of 21st century ICT skills is known as employment gateway (Blanco & Florencia, 2010). Based on Atasoy (2012) having at least one basic, medium or advanced ICT skill is associated with 20 to 30 percent higher probability of being employed. According to the study by Bello et al. (2013) ICT skills are considered one of the most important requirement for employment. The study was acknowledged by different scholars, researchers, educationist, agencies and organizations.

ICT and Business

ICT enhances many areas of business; for example, ICT in marketing has come of age and organizations of various sizes employed various ICT techniques for running their daily operations. Small and medium size enterprises (SMEs) use information and communication technologies (ICTs) in their business and marketing operations where ICT are productivity improvement drivers by being the key factors for innovation and entrepreneurship for innovation to take place in SMEs; for example the use of ICT in

marketing in companies, the variations and combination of their use of ICT tools like, internet, emails, short messaging system (sms), multimedia messaging service (mms) and other methods they may prefer where ICT as a crucial tool for businesses especially when efficiency improvement is the main agenda as a whole as ICT also support customer related services (Sharma, 2011). This include enabling the business to make good management of its customer databases, web pages for the customers, market study as well as marketing campaign like direct mails.

Studies have shown that ICT can contribute towards improving the education process and enhancing the efficiency and effectiveness of education process at all levels. Prior to ICT there has been many modes of delivering teaching contents such telephone, radio and television and printed notes countries (Mehta, 2014) but with the use of ICT can make teaching and learning process much faster, easier and interactive. Information and communication technology (ICT) has now become the backbone of many modern society making knowledge of ICT and having needed skills is important although some countries are still at the early stage of integrating ICT into its systems due to problems like unavailability of infrastructure and resources like financial considerations.

ICT and Culture

People from different cultures might have different perceptions about ICT (Nabeel et al., 2013). UNESCO aimed to provide educational facilities for the people in the country towards creating a competent and knowledge worker. This is possible to be achieved if the students are taught the knowledge and skill of ICT while in schools. By having this ICT learning culture, it is possible to cultivate and groom potential worker with the needed ICT skills.

2.2.4 Motivation

Motivation encompasses a multitude of factors driving the selection, the persistence and the engagement of particular activities to attain an objective (Reeve, 2014). Motivation refers to the process whereby goal-directed behavior is instigated and sustained (Peters, 2015). Motivational factors are therefore considered to be part of one's goal structures and beliefs about what is important (Braver, 2015). Sufficient levels of motivation in students are seen to be related to the innovative role of technology. ICT plays a very crucial role in offering easy success to knowledge, information & communication. It provides e-content delivery system in early grades of education levels.

Education

ICT bring changes to nearly everything related to our lives including the way business is done and teaching is conducted. ICT engaged with accurate information and speedy services covering large geographical area. ICT enables innovation and efficiency to take place turning the teaching and learning process into a new paradigm of digital information. ICT has become a powerful tool to provide learning opportunities where online learning makes many people across the globe able to gain knowledge anywhere and not necessarily limited to the educational natural setting in the classroom.

ICT feature to allow different mode of learning allowing teaching material and notes to download plus teleconferencing technologies make a big contribution towards education as teaching and learning now became almost no boundary. ICT has becoming ubiquitous and a technological literacy now has become a competitive advantage in a now globalizing job market. ICT has transformed HEIs to meet with the industry demand of having knowledge and competent worker with the required ICT skills. HEIs are in sync with IT development by incorporating ICT into their curriculum highlighting their awareness.

Economy

In the region of Malaysia, the Malaysian Prime Minister commented that ICT is an be industry and an enabler to increase productivity and efficiency for major economic sectors (Hussein et al., 2010; Chaiboonsri, 2017). The rapid expansion of ICT in Malaysia saw the launching of Multimedia Super Corridor (MSC) in 1996 to accelerate its entry into the Information Age (Mohamad et al., 2011). In 1996 the Multimedia Super Corridor Malaysia (MSC-Malaysia) was initiated by the government of Malaysia as the ICT companies and industries competitive market platform. MSC Malaysia hosted nearly 1000 local and multinational companies of ICT and multimedia products and services. The e-Government initiative, one of MSC Malaysia Flagship Applications, was introduced by the Malaysian government to provide delivery of services for its citizen (Hussein et al., 2010).

Productivity

The effects of ICT on labor productivity have been studied in several empirical works (Euripidis, 2009; Badescu, 2009). HEIs play a very significant role in producing competent and knowledgeable employees for industry to produce quality products and services while industry became competitive by having superior quality products and services in the markets. With the changing in global request for competent staff for employment ICT has become a basic employment requirement entry skill. Competent staffs help organizations to compete effectively and productively. The economy of a country depends on quality human capital that needs to be developed while in school. The human capital development is analyzed from the ICT skills development; yet there are many factors affecting the acquisition of ICT skills. This study provided a rich understanding on factors affecting ICT skill by the students in higher learning institutions.

In the job industry, the employer is demanding for potential employees having the knowledge and skills related to the job. With ICT, it enables potential employee to equip themselves with these knowledge and skills making them more in favor of the potential employers. ICT can improve knowledge, skills and make potential employees more desirable for the globalization challenges and help to improve the economic status of the nation's especially in the era of the 21st century. Overall, the benefits of ICT towards industry include efficiency, superior product and services, increased productivity and enhanced performance (Quinet, 2002).

Must Know Skill

Computer assisted instruction (CAI) has been implemented despite some rejection by some lecturers (Eynon, 2008) but computers and the Internet have gained popularity in many universities (Al-Gahtani, 2016). Many universities now have e-learning where teaching takes place not only using the traditional mode of textbooks but also via virtual notes in a virtual learning environment. Furthermore, with social networking sites most students remained interconnected (Pembek et al., 2009) and it becomes undeniable as port of the students' life as ICT increases in its ubiquitous presence (Wit et al., 2012). This indicated that the students do have some basic ICT skill as defined by the definitions of ICT skill above.

2.3 ICT Acceptance Models and Theories

In this section, discusses the various theories and models relating to the adoption of a product or technology by users. These theories and models have been developed, tested and validated through vigorous and numerous researches.

These models include Technology Acceptance Model (TAM), TAM extended model (TAM2) and UTAUT. Technology Acceptance Model (Davis, 1989) evolved from the

Theory of Reasoned Action (TRA) by Icek Fishbein (1975) a well- developed behavioral prediction model and one of the fundamental theories on human behavior while TAM explains technology acceptance. Another extension of TRA is Theory of Planned Behavior (TPB) by (Ajzen,1991). Another important model Unified Theory of Acceptance and Use of Technology (UTAUT) will be the model used in this research. The details of these models are explained later in this chapter. Extended TAM has been used in many disciplines for example Edgar et al. (2012) studied the assessment of ICT skills in agriculture courses using extended TAM while Pietro et al. (2015); Osakwe et al. (2016) and Kim (2014) used extended TAM to investigate the mobile cloud acceptance by end-users and to identify the different between student's ICT skills (Wit et al., 2014).

Lately, many technology acceptance studies uses UTAUT in the research; for example studying of technology acceptance in the health care (Dwivedi et al., 2016; Hoque, 2017), prediction on the acceptance of open data (Zuiderwijk et al., 2015), adoption factors of cleaner production technology (Khorasanizadeh et al., 2016), adoption of e-governments (Gupta et al., 2008; Voutinioti, 2013; Kurfalı et al., 2017), the acceptance of tablet based on UTAUT (Kate et al., 2015), social media use (Staves, 2012; Borrero et al.,2014), examining user acceptance of E-Syariah (Yahya et al., 2012), acceptance of ICT in Indonesia (Sriwindono, 2012), acceptance of whiteboard by teachers (Šumak, 2016) and student intention to use desktop web-conferencing (Lakhal, 2016).

User acceptance is defined as reception by users to use the information technology system in supporting to the tasks assigned (Rasimah et al., 2011). Though scientifically the user acceptance is relatively of a recent concern but the stakeholders especially the system developers and the end users need to ensure that the developed system is developed for its indented objective and purpose (Dillon, 2001; Venkatesh et al., 2003) and systems are accepted by users if the system is able to help in their daily tasks. The

studies indicated that technological acceptance is categorized by the psychology of the users, the technology design process, and the nature and quality of the technology (Dillon & Morris, 1996; Wang et al., 2010). As such, technology user acceptance covers research subjects such as human attitude, system analysis, management and technology diffusion (Dillon & Morris, 1996).

This research has review various theories and models in an attempt to understanding for chronological background of user acceptance of ICT. The following section discussed the theories and models that is relevant for this research.

2.3.1 Theory of Reasoned Action (TRA)

One of the fundamental theories on human behavior is the Theory of Reasoned Action (TRA) by (Fishbein, 1975). It was developed and validated as a model of behavioral prediction and was vested to study behaviors which include attitudes and instinctive and intuitive patterns known as subjective norms. According to TRA prediction based on attitudes toward behavior and subjective norm it can help to understand the specific intentions and behaviors and that is the reason why human behavior can be explained by the commonly designed of TRA (Ajzen & Fishbein, 1980). According to Venkatesh et al. (2003) attitude toward behavior and subjective norm are two the significant constructs of the TRA. The TRA has been further developed to other dominant user technology acceptance models such as the Technology Acceptance Model (Davis, 1989) and the Theory of Planned Behavior (TPB) by (Ajzen, 1991).

Attitude is defined the mindset and feelings of behavior (Ajzen & Fishbein, 1975). Subjective norm is reflected by the instinctive and intuitive patterns as well as the perception important (Ajzen & Fishbein, 1975) whereby positive attitude results in positive outcome of behavior (refer to Figure 2.2).

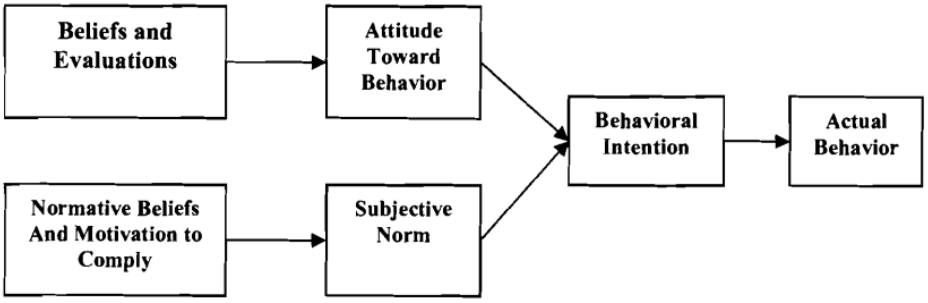

Figure 2.2: Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975)

2.3.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) among the most popular models used in researches relating to technology user. TAM evolved from Theory of Reasoned Action (TRA) and initially proposed by (Davis, 1989). On a theoretical basis TAM provides the determinants of human computer usage behavior explanation inherited from TRA (Ajzen & Fishbein, 1975). The TAM model has been extensively and exhaustively researched on different domains (Davis, 1989) and TAM'S constructs has been investigated on many ICT in researches in HEIs (Wong & Timothy, 2009). Based on these researches the main determinant factors of IT usage are found to be perceived ease of use (PEOU) and perceived usefulness (PU) of IT.

Perceived ease of use (PEOU) is to the degree of believing that using a particular system would be physical and mental effort free while perceived usefulness (PU) is the degree believing that job performance can be enhanced when using a particular system (PEOU) (Davis, 1989). It has been proven in prior researches that PU and PEOU able to predict an individual's attitude towards using a particular system by influencing the attitude of the uses. As mindset and feelings of behavior influences the attitude it also influences perceived usefulness (PU) and perceived ease of use (PEOU) (Davis, 1989).

Users' behavioral intention (BI) is highly influenced by attitude of using a particular system, and in sequence, the actual use of the system (AU). Hence, individual's behavioral intention (BI) can help to predict user actual use (AU). Behavioral intention (BI) is based on the attitude and perceived usefulness (PU) (Davis, 1989). Figure 2.3 depicts the relationships of PU, PEOU, attitude, BI and AU.

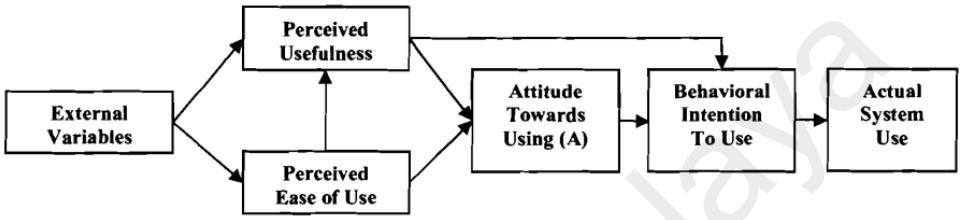

Figure 2.3: Technology Acceptance Model (TAM) (Davis et al., 1989)

Venkatesh & Davis (2000) further proposed TAMII by extending TAM's constructs and by doing so it has diminished the influence of attitude in the Theory of Reasoned Action (TRA). TAMII is used by this research because the image and subjective norm are investigated and used as variables for the social factor. TAMII was developed based on extension of TAM which include interrelated constructs factors like perceived usefulness (PU) and usage intentions in terms of social influence (subjective norm, image, voluntariness, & experience) and cognitive instrumental processes (job relevance, output quality, perceived ease of use (PEOU) and result demonstrability) (see Figure 2.4).

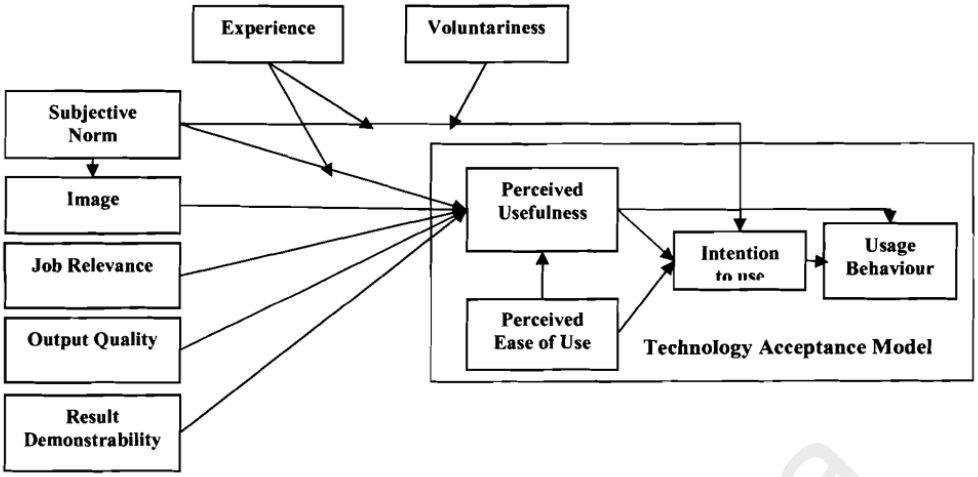

Figure 2.4: TAMII (Venkatesh & Davis, 2000)

2.3.3 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) (Icek, 1988) evolved from Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975) aimed to capturing the determinant factors of behavioral intentions in order to investigate human behavior by (Ajzen, 1988; Ajzen & Fishbein, 1975). The TPB model suggested that key factors that help determine the behavioral intention to use the technology is perceived behavioral, subjective norm and attitude as depicted in Figure 2.5.

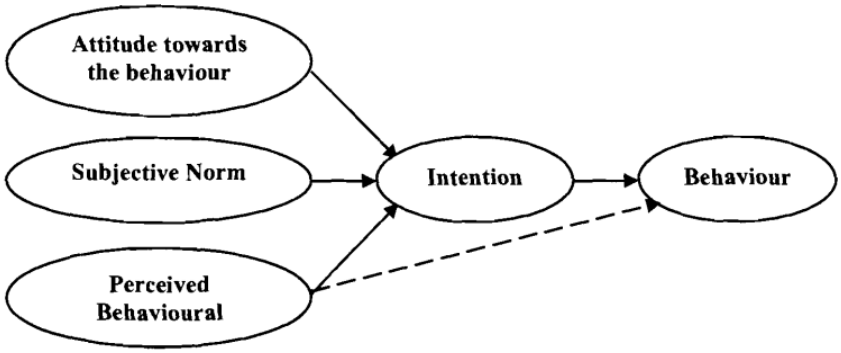

Figure 2.5: Theory of Planned Behavior (TPB) (Ajzen, 1988)

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

Prior researches showed many competing and complementary models with different sets of constructs as the acceptance determinants factors; yet among the most notable amongst these models are the Theory of Reasoned Action (TRA), Theory of Planned Behavior, (TPB), Technology Acceptance Model (TAM), Extension of the Technology Acceptance Model (TAM2), Diffusion of Innovation Model (DOI) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Alshehri et al., 2013).

One of widely used in modeling acceptance of ICT is the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al., (2003). It was said that 70% of technology acceptance behavior were explainable by using UTAUT. The four key concepts used by UTAUT consisting of performance expectancy, effort expectancy, social influence and facilitating conditions showed direct influence on intention to use it. Gender, age, experience and voluntariness of use are moderating factors of the relationship in the model (Nassuora, 2012). The UTAUT model is shown in Figure 2.6.

UTAUT model is useful for analyzing issues involved in the identification of skills, competencies, and specific training to achieve an understanding of predictors of actual usage of technology (Abu, 2015).

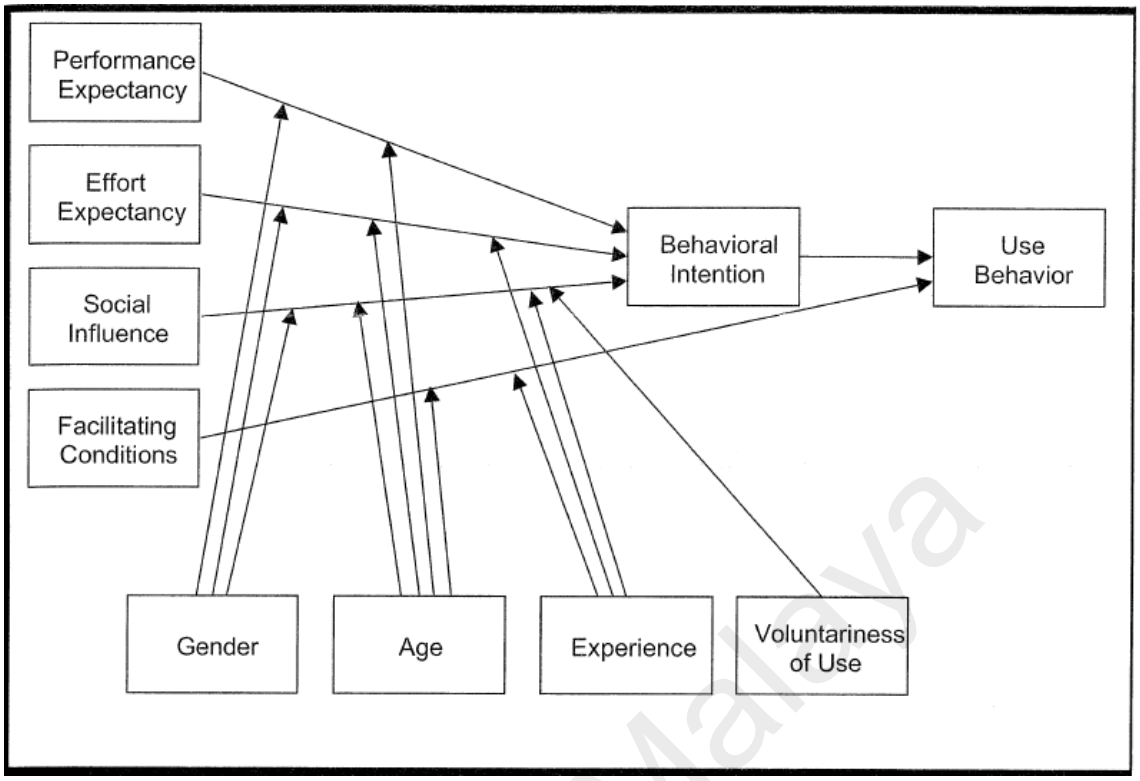

Figure 2.6: UTAUT Model (Viswanath Venkatesh et al., 2003)

UTAUT was developed by using the strength of eight significant technology acceptance models, namely Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT), Theory of Reasoned Action (TRA), Motivation Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB, Model of PC Utilization (MPCU), and Social Cognitive Theory (SCT) (Nassuora, 2012).

The UTAUT construct is as follows:

(i) Performance expectancy: the degree to which an individual believes that using the system will help him or her to attain gains in job performance.

(ii) Effort expectancy: the degree of ease associated with the use of the system. Social influence is the degree to which an individual perceives that important others believe he or she should use the new system.

(iii) Facilitating condition: the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system.

2.3.5 Diffusion of Innovation (DOI)

Using the characteristics of Rogers' model, Benbasat (1991) proposed the Diffusion of Innovation (DOI) theory where adaptation measurement of information technology innovations is made possible. The six constructs of Rogers' used by DO1 include relative advantage, compatibility, complexity, observability and trial ability (Venkatesh et al., 2003) where eventually DOI helped to further add additional constructs including image, voluntariness, results demonstrability and visibility.

It is hope that the discussion of various theories and models help to provide inner knowledge and understanding of various different factors that influenced the acceptance of technology.

2.3.6 Innovation Diffusion Theory (IDT)

New technologies are used depending on specific channels and social norm as perceived by DOI (Rogers, 1995) where the eagerness of uses to use the technology differs and changed over time. The characteristics of technology acceptance of the Innovation of Diffusion Theory are relative advantage, compatibility, complexity, trial ability, and observability.

2.4 Factors Affecting ICT Skills

In this section effective factors on ICTs are identified and determined by researchers in various field of ICT in understanding the relationship of behavioral intention to use technology as the determinant factors has potential influence affecting ICT use. Many

factors studied seems important and can be the determinant factors for affective factors on student's ICT skills.

In conclusion, previous studies shown that there are factors with positive outcome toward the acceptance of new systems or technology (Celik, 2013; Gil-Flores, 2017). These factors include attitude, anxiety, self-efficacy and the availability of time, performance expectancy, effort expectancy, social influence and facilitating conditions.

2.4.1 Age

Previous researches indicated that age is significant to ICT skill. Prior researches shown that compared to the older students the younger students are more frequent ICT user knowing the advantage the technology has (Jingyan & Hao, 2014). The study by Suwarto (2015) found evidence that there is a difference of ICT adoption, skill and use based on age and education level. It was further revealed (Suwarto, 2015) that age is one of the significant factor that associate attitude and computers and this was confirmed by Wit et al. (2012) & Korobili et al. (2010) that younger people had more positive attitude and demonstrated higher computer literacy.

Age is found to affect technology use, perception that indirectly influencing that mitigate the relationships between technology use and perceptions (Manos, 2015). However, there were some researchers that are in contrast with the findings of the previous researches in terms of age; for example, Gupta et al. (2008) found that age does not have any effect on the ICT skills. Also Deursen et al. (2011) found that medium-related ICT skills appeared to be negatively influenced by age while Mehrak & Yadollahi (2011) indicated that ICT integration correlated negatively with age.

Gender and age related differences in ICT participation were greatly influenced when comparing the home and school environment. In the study of student's attitude toward

computer use, Fančovičová & Prokop (2008) found that lack of internet connection at home caused greater supplementation of internet-related activities in schools relative to home. The study by Magsamen et al. (2015) that examined the use of tablet devices using UTAUT discovered that that construct that affect the use of ICT were effort expectancy and facilitating conditions that positively relate to use intention.

Based on the studies reviewed, it can be seen that there were opposing results about the relationship between age, computer and ICT usage in the literatures reviewed where some studies indicated positive relationship while others reported negative relationship as summarized in Table 2.1.

Table 2.1: The Usage and Effect of Age on ICT

Author	Description	Findings
(Jingyan & Qiang, 2014)	This study aimed to learn how children use the Internet at home, and what factors impact their online behavior in such contexts	The finding of the study showed that age is the other factor influencing the online activities of students
(Wit et al., 2012)	This study to investigate basic ICT skills changes among freshmen between 2005 and 2009.	The study indicated that age had high effect on the computer literacy
(Korobili et al., 2010)	This study used computer anxiety rating scale (CARS) and computer attitudes scale (CAS). attempted to understand the students' of the Library and Information Systems (LIS) student, Department of Technological Educational Institute (TEI) of Thessaloniki levels of computer anxiety and attitudes toward computers .	The findings indicates that age has positive affect towards computer usage
(Roumeliotis, 2015)	This study investigated the technology-based services acceptance and actual use using UTAUT.	Age is found to affect technology use.
(Gupta et al., 2008)	The study looked into the ICT embracement in a developing country government agency.	In this study age had insignificant affect on the ICT.

Table 2.1: Continued

Author	Description	Findings
(Deursen et al., 2011)	This study focused issues of Internet skills digital divide.	The result indicated that age has insignificant affect on Internet skill
(Fančovičová & Prokop, 2008)	The study investigated the students' attitudes toward computer use in Slovakia.	In this study age was found to have significant affect on computer use.
(Magsamen et al., 2015)	This study examined use of tablet devices using UTAUT	It was found there was differences in use based on the generation gap.
(Rahimi & Yadollahi, 2011)	The study to determine computer anxiety level in using ICT in teaching.	Age was found not correlated to ICT integration.

2.4.2 Gender

The literature reviews done suggested the existence of a prominent differences in terms of gender and level of ICT skills. Age and gender studies both quantitative and qualitative are needed in order to gauge the variety preferences and ICT devices used, tools and media working alongside the education agencies to incorporate gender and ICT issues in practice.

Roumeliotis (2015) found that gender has a positive affect toward the acceptance of ICT. Also, the study by Kim et al. (2014) indicated that female showed higher levels of computer usage than male while according Tondeur et al. (2016) showed that women, although they have less positive attitudes towards computers in general than men, they are not likely to be disadvantaged in educational settings since their attitude towards computer use for educational purposes does not differ from men's. This study indicated the more pragmatic stance of women regarding computer use benefits them in an educational setting. Verhoeven et al. (2014) conducted a study on ICT learning experience and research orientation as ICT skills predictors and use of ICT among secondary school students indicated positive relationship between gender and ICT acceptance of ICT with boys having higher scores compared to girls. According to the

study by Achampong (2012) there is gender difference in ICT use among university students where it was found that gender and computer resources significantly affect on the student's ICT skills. The study of Suwarto (2015) found that female is negatively related to computer use for leisure activities; however, there was no relationship found between gender and study-related computer use. Study by Yadollahi (2011) also found that there was no gender - ICT integration relationship. Based on the study of student's attitude toward computer use, Fančovičová (2008) showed that there were differences in relation to gender and age in ICT participation and it was also greatly influenced by location whether it was at home or some other environment.

Cazan et al. (2016) when studying students of high-school and university in Romania on computer anxiety and attitudes found positive relationship between gender and the use of computer and internet. In contrast, Gupta et al. (2008) found no significant moderating effect of gender on ICT when they did the study on government organizations.

Table 2.2: The Usage and Effect of Gender on ICT

Author	Description	Findings
(Kim et al., 2014)	This study aimed of examining individual and school level variables affecting the ICT literacy in Korean elementary school students.	Analysis showed that female students ICT level was higher than male
(Tondeur et al., 2016)	This study responded to a call for research on how gender differences emerge in young generations of computer users.	It was found that women have less positive attitudes towards computers in general than men.
(Suwarto, 2015)	This study examined the skill and use differences among small and medium enterprises managers based on demographic factors.	Gender was found as one of that factors affecting the ICT.
(Verhoeven et al., 2016)	This study investigated the ICT learning experience and research orientation as predictors of ICT skills and used among undergraduates	It was found that that in general women have less positive attitudes towards computers than men.
(Achampong, 2012)	The aim of this study is to assess the ICT skills of students in Cape Coast. University.	It was found that gender and computer resources significantly affect on the students ICT skills

Table 2.2: Continued

Author	Description	Findings
(Fančovičová, 2008)	This study was done to examine the students' attitudes toward computer use in Slovakia	The findings indicated that gender was one of the factors that affect computer use.
(Roumeliotis, 2015)	The study studied perceptions that affect technology-based services acceptance, actual use and readiness using UTAUT.	The research resulted that gender is one of the affecting factors in ICT use.
(Gupta et al., 2008)	This study investigated ICT adoption in a developing country government agency.	The findings of this study indicated that gender does not has any effect on ICT.
(Rahimi, 2011)	The study was to determine teachers' computer anxiety level in relation to ICT integration in classes	In this study, ICT was-found not to be related to gender.

2.4.3 Experience

Studies have shown that more experiences ICT users individuals have a higher impact on ICT use (Luse et al., 2013). Similarly, students who used modern technologies also have higher impact compare to those less experience. There seems to be consensus among some researcher that technology acceptance is highly influenced by experience (Wit et al., 2012). Rohatgi et al. (2016) identified that previous personal experience in ICT is the strongest predictor toward the acceptance of computer or any skills related to ICT. In some instances, people also need specialized training and experience to acquire skills necessary to use these ICTs. Greater experience increases the pleasure and convenience of using ICT, suggesting that people's ICT adoption behavior is positively related to the degree of their computer experience (Yu et al., 2017).

Venkatesh & Davis (2000) added that experience positively affect technology perceived ease of use. In conjunction with this finding, Faizan et al. (2016) found that experience ICT user help to predict the acceptance and usage of learning technologies and behavior toward the technologies. If one had a positive experience with electronic services, then that person is more likely to use the service again and probably share this

positive experience with others thereby encouraging adoption of e-service. However, negative experiences such as erroneous information or technical error will bring reverse effect to discourage adoption and use of the e-services (Kim et al., 2009).

The study by Aesaert(2014) shown many factors affecting the students' ICT experience which include attitude towards ICT, parental ICT attitude, controlling learning style, analytic intelligence and a motivation, are related to primary school pupils' ICT self-efficacy. As mentioned earlier, experience does affect the ICT skill and this is confirmed by the study done by Verhoeven et al. (2014) indicating that ICT experience and the frequency of using computer are the most predictive variables in developing ICT skills. Experience is considered an important factor when identifying individual differences in Information Systems studies; however, user beliefs or perceptions of IT usage may change with time as the user gains experience. It was indicated also that prior experience with a similar technology is a major factor influencing an individual's IT adoption behavior, whereby past experience with an information system is likely to result in the individual being abler to evaluate the new information system clearly and confidently (Jieun et al., 2015).

It was further confirmed with the studies done by Castañeda et al. (2007) that behavior intention (BI) to use the website is positively affected by user experience and Verhoeven et al. (2010) that experience has a positively affect the students to learn and use computer and its related applications and software. In another study by Lee & Kim (2009) indicated that Web experience is influenced by the use of intranet. However, there are also studies that shown ICT skills has no direct relationship with experience. For example, Mariam et al. (2016) examined the impact of facilitating conditions and usage behavior by unexperienced user and found that experience did not trigger any interaction effects to these factors. In addition, Rahimi & Yadollahi (2011) found that there is negative

correlation between ICT integration with age and experience teaching tenure and that ICT skills was not related to gender.

Table 2.3: The Usage and Effect of Experience on ICT

Author	Description	Findings
(Rohatgi et al., 2016)	This study examined the role of ICT self-efficacy of students' ICT use and their achievement in a computer and information literacy test.	The study concluded that experience is the strongest predictor toward the acceptance of computer.
(Tai-Kuei et al., 2017)	The study looked at understanding the factors influencing the adoption behavior of information communication technology	The findings of this study indicated that ICT adoption is related to computer experience.
(Mariam et al., 2016)	The study investigates employee recruitment and selection via social media	In this study experience does not have any impact on ICT adoption.
(Faizan et al., 2016)	This study did an assessment of the students' acceptance and usage of computer supported collaborative class rooms in hospitality and tourism schools.	The findings showed that learning and acceptance of technologies can be predicted by experience
(Lean et al., 2009)	This study is an exploratory study on the e-government services in Malaysia.	It was found that if the users have positive experience with e-services, they will be more likely to use the service.
(Aesaert , 2014)	The study aimed to identify pupils' ICT self-efficacy factors	The study found that experience do affect on the students ICT skill.
(Verhoeven et al., 2014)	The aim of this study is to investigate ICT learning experience and research orientation as predictors of undergraduate student's ICT skills and use.	It was found that experience is considered an important factor when identifying individual differences in Information Systems studies.
(Jieun et al., 2015)	The study explained the overall adoption processes by starting from the characteristics of a media tablet to adoption intention via perceived value	In this study experience was found to have significant affect on ICT skills.
(Castañeda et al., 2007)	The study predicted websites visits and Internet experience gained over time using UTAUT	It was found that behavior intention (BI) to use website is positively affect by experience.
(Verhoeven et al., 2010)	The study investigated perception changes on ICT competency and computer used among undergraduates.	It was found that experience positively affect the students to learn and use computer.
(Kim, 2009)	This study reported organization intranet use by extending TAM using external factors and subjective norm	This finding of this study indicated Web experience is influence by intranet used.
(Rahimi & Yadollahi, 2011)	This study was to determine computer anxiety level and ICT integration in classes	It was found that experience is found not to be correlated with ICT integration.

2.4.4 Voluntary of Use

Voluntariness is when an individual opt to use a system (Donaldson, 2010) and the level that potential adopters (of technology) perceived it was a non-mandatory adoption decision (Gilbert, 2015). TAM and TAM2 had made certain assumptions relating to computer use outside of the workplace, such as having adequate access to systems and since these models were developed to assess computer used in workplace therefore voluntary use of computers is of no questions since its mandatory to use computers; however, in the academic environment users have option to opt or not to opt and to use or not to use the information systems and technology (Donaldson, 2010).

Voluntary use of compute was first introduced in innovation diffusion theory and few researchers had explored using this construct. For example, Venkatesh and his colleagues proposed that TAM2 and UTAUT to include the moderating effect of voluntariness (Venkatesh & Davis, 2000; Venkatesh et al., 2003) that reflect the degree of voluntariness in using the system in a non-mandatory environment. Voluntary use of compute has also been used for social influence and BI as moderating factor construct (Evwiekpaefe, 2011).

According to Adnan (2016) voluntariness of use as the most striking variables towards the acceptance of tablet PC (TPC) by business faculty in higher education. This is supported by the study of Zuiderwijk et al. (2015) who found that voluntariness of use significantly influences behavioral intention and is the predictor to open data technologies use.

Table 2.4: The Usage and Effect of Voluntary of Use on ICT

Author	Description	Findings
(Venkatesh & Davis, 2000)	The research aimed to explained social influence, cognitive instrumental processes, perceived usefulness and usage intentions relationships	The finding of the study indicated that voluntary of use has positive impact on ICT use.
(Venkatesh et al., 2003)	The study investigated ICT unified view of user acceptance.	The finding shown that voluntary of use has positive affect on ICT use
(Evwiekpaefe, 2011)	This study proposed e-commerce user adoption conceptual framework using UTAUT model.	The finding of this research indicated that voluntary of use does have significant affect on ICT use.
(Adnan, 2016)	This study mainly examined the acceptance of Tablet PC (TPC) apps as a learning tool among senior users and what factors may accelerate TPCs use.	It was found that voluntariness of use as most striking variables towards the acceptance of TPCs.
(Zuiderwijk et al., 2015)	The aim of this study is to investigate predictors of open data technologies acceptance and use.	The results show voluntariness of use as one of the predictors for ICT use.

2.4.5 ICT Competency

Computer competency is defined able to efficiently use a computer to perform the basic task Wikianswers (2011). Computer efficiency for educators include the skills and knowledge of hardware, application software and systems and programming integrating systems Madden, (Ellen & Ajzen, 1992). Competency is a comprehensive term for proficiency and capability doing certain tasks with quality output and less time required (Nahyun & Song, 2011). ICT competency is needed to improve ICT education program. United States and Korea are among the countries that have developed standards for ICT competency.

In 2006, Educational Testing Services (ETS) and major universities in the United States helped to co-develop an ICT competency test tool to be used in the United States. The purpose is to clarify and able to quantify the outcome of learning using ICT, as the need for measuring cognitive problem-solving skill in digital environments increases (Archibong et al., 2010). Similar assessment on ICT has also been conducted in Korea whereby in 2001, Ministry of Education, Science & Technology (MEST) of Korea

developed the ICT Skill Standards for Students (ISSS) and test tools for more systematic ICT education in schools. These assessment has helped the students in Korea to improve their skill using ICT (Cha et al., 2011).

Integrating educational sector with information technology system in make possible by developing the students' IT competence (Matotek, 2013). There has been an ever increasing use of computers in education and ICT competencies has been identified as strong appropriate usage of ICT skills determinant. In this study, ICT competency is used as a moderator factor to moderate the independent variables and dependent variables relationship.

In this study the ICT competency has been measured based on the international computer driving license (ICDL). ICDL sets the end user ICT skills competence within the international business community as an international standard (Ahmad et al., 2010). Certification of ICDL programs helps to increase the ICT skill of the end user; hence the human capital development and productivity improvement can be achieved by enhancing skills of the competent users. In this study, ICT competency is used as a moderator factor to moderate the independent variables and dependent variables relationship (see Table 2.5).

Table 2.5: The Usage and Effect of ICT Competency

Author	Description	Findings
(Ahmad et al., 2010)	This study investigated the public sector employees computer based distance training system	The study explored the effectiveness of ICDL (ICT competency) on the employment.
(Cha et al., 2011)	This study studied the measuring achievement of ICT competency for students in Korea.	The finding of the study identified the importance of ICT competency.
(Matotek, 2013)	This research analyzed the acceptance of European Computer Driving License (ECDL) certificate in labor market in Republic of Croatia.	The finding of the study shows the importance of computer competency.
(Nahyun & Song, 2011)	This study examined information competency personality traits	This research shows that personality traits influenced ICT
(Archibong et al., 2010)	This study examined ICT competence ICT usage among academic staff.	The research shows that ICT competency is affective to ICT.

2.4.6 Attitude

Attitudes refers to the feelings, character and disposition of a person (Fishbein and Ajzen, 1980). In this research, attitude towards computer include the mindset and perspective of the users and their inclination to use the computers (Korobili et al., 2010). There have been various results on studies of attitude in predicting behavior intention (BI) and technology acceptance depending on the studies done giving a mixed result in the researches done. There are many other studies that showed attitude positively affect ICT skill, for example the work of Wit et al. (2014), Dündar & Akçayır (2014), Slechtova (2015) & Khangamwa (2012). Attitude significantly affect software implementation in organizations particularly involving younger workers (Venkatesh & Fred Davis, 2000).

Based on Al Rababaa (2013) a study on m-commerce study conducted in Jorden in 2010 found that attitudes positively affect m-commerce use by Jordanians. Similarly, attitude, perceived usefulness to use were the significant determinant of M-Internet (Cheong and Park, 2005). Students are also found to have a positive attitude toward tablet

PCs (Dündar & Akçayır, 2014). Hunsinger & Smith (2008) identified that attitude, subjective norm, and perceived behavioral control significantly influence behavioral intention for students to select IT certification.

However, students' willingness to use ICT for studying and attitudes to e-learning are not homogenous and show certain relation to their field of study and computer skills (Slechtova, 2015). For example, it was found that female students had more positive attitude towards computer education than their male counterparts (Opoku & Kuranchie, 2014), age and gender affecting the ICT skills and ICT use (Fančovičová & Prokop, 2008), attitude have significant effect on the ICT acceptance and readiness (Gombachika, 2012) and attitudes toward computer usage are unrelated to culture and gender (Abedalaziz et al., 2013). There was no significant attitude and behavior intention relationship and was the argument was that effort expectancy caused affective reactions (e.g. intrinsic motivation); hence it was excluded it from the original UTAUT model (Venkatesh et al., 2003)

This research attempt to study the attitude and computer used relationship. In general, increased use of computers is normally lead by positive attitudes and easy friendly systems tend to be used more and favorable by users.

Table 2.6: The Usage and Effect of Attitude on ICT

Author	Description	Findings
(Venkatesh & Davis, 2000)	The research investigated process of social influence and cognitive instrumental using UTAUT particularly perceived usefulness and usage intentions	The findings of this research indicated the significant effect of attitude.
(Venkatesh et al., 2003)	This study examined unified view of user acceptance of information technology:	The results of the study shown that attitude does not affect ICT acceptance.
(Wit et al., 2014)	This study investigated ICT skills proficiency	Study shown that students has positive attitude toward the use of ICT skills is more proficient.
(Hunsinger, 2008)	This study investigated IT certification choice influencing factors	The findings confirmed that attitude was found as one of the factors that significantly influence behavioral intention
(Dündar & Akçayır, 2014)	This study was to find the effect of computer and Internet by students on attitudes toward tablet PC use.	The findings indicated have a positive attitude toward ICT can easily adapt tablet PCs.
(Opoku & Kuranchie, 2014)	The purpose of the study was to explore students' dispositions and attitudes toward computer education.	The study revealed that the female students had more positive attitude towards computer education than their male counterparts.
(Fančovičová & Prokop, 2008)	The study was on students' attitudes toward computer use in Slovakia.	The study found that the students have positive attitude toward the computer use.
(Gombachika, 2012)	The research examined the effects of ICT readiness dimensions on ICT acceptance among Technical, Entrepreneurial and Vocational Training (TEVT) students in the University of Malawi, using correlation and regression analyses.	It was found that attitude have significant effect on the ICT acceptance by the students.
(Mehrak & Yadollahi, 2011)	The study aimed at exploring the overall Malaysian and Jordanian teachers attitudes toward schooling usage and personal usage of computers,	The study confirmed that attitude is a crucial factor for ICT acceptance.

2.4.7 Anxiety

Computer anxiety is defined as generalized emotional uncertainty and restlessness leading to the users to be apprehensive and nervous in using the computers (Igbaria & Iivari, 1998). Computer anxiety create an unhealthy perception where users tend to avoid use of computer with the thought they are unable to use the computers (Chuo et al., 2011).

Individual anxiety towards a particular behavior can be generally defined as the evoking anxious or emotional reactions toward the behavior in question. Here, the interest is the behavioral intention to adopt a new technology (Rasheed & Shiratuddin, 2009).

In Social Cognitive Theory (SCT) anxiety was treated as the main construct (Albert Bandura, 1986) and being the prominent determinant of intention in SCT, but this was not so in the UTAUT model (Venkatesh et al., 2003).

Many studies have been done in relation to anxiety. A study has been done on the adoption of health information Systems (HIS) by health workers in developing countries contextualizing UTAUT indicated that computer anxiety and training adequacy as important direct behavior intention to use determinants and actual use of HIS respectively. In a computer supported education environment attitude towards technology, perceived computer self-efficacy and computer anxiety are important factors to consider (Celik & Yesilyurt, 2013). In addition, Chuo et al. (2011) identified that self-efficacy and computer anxiety are important antecedents of perceived ease of use, and perceived useful; organizational support does has significantly influence on perceived ease of use.

Many researches has been done in relation to computer anxiety. For example, Karuri et al. (2013) using UTAUT found that in adopting a system in a developing country computer anxiety and training adequacy as important determinants that directly affect behavior intention to use and actual use. According to Chuo et al. (2011), computer anxiety refers to an individual's anxiety aroused in the process of using or facing the computer. Computer anxiety has significant influences on an individuals' intention to use the computer, the cause is mainly that an individual's unfamiliarity with the computer makes him worried that he might appear clumsy in front of others or worried that his ignorance may cause damage to the computer. Hence, it is learned that computer anxiety

results from the individual's unfamiliarity with the computer and develops the anxious state accordingly.

Chuo et al. (2011) defined computer anxiety as an individual's anxiety aroused in the process of using or facing the computer. Computer anxiety has significant influences on an individuals' intention to use the computer, the cause is mainly that an individual's unfamiliarity with the computer makes him worried that he might appear clumsy in front of others or worried that his ignorance may cause damage to the computer. Hence, it was learned that computer anxiety results from the individual's unfamiliarity with the computer and develops the anxious state accordingly. The finding of a study by Cazan et al. (2016) indicated the importance of the computer anxiety that helps the students to learn ICT better. Rahimi & Yadollahi (2011) found that computer anxiety positively affects the integration of ICT. However, ICT integration and age and years of teaching experience are negatively correlated and found not to be related to gender as well (Rahimi & Yadollahi, 2011).

The causes of computer anxiety include: (1) individuals dread to cause damage to the computer and are also worried that they may make mistakes, (2) the uneasiness in the mind which result from individuals' feeling ignorant or awkward when they interact with the computer, (3) the fear of computer is reflected from the fear of technology or math, (4) individuals are worried that radiation might affect them and cause their health to deteriorate when they work in front of computer, (5) the fear that individuals have toward new or unfamiliarity things leads to the fear of computer technology, (6) individuals are worried that the computer will make a threat to or limit their development of intelligence, (7) individuals feel troubled that the time to use computer is so insufficient that they fail to take care of relevant matters with the pre-scheduled time and cause the state of psychological uneasiness, (8) some individuals consider themselves inferior to computer

in intellectual development and they also often tend to give up the opportunities of independent thinking (Chuo et al., 2011).

Table 2.7: The Usage and Effect of Anxiety on ICT

Author	Description	Findings
(Vehbi & Yesilyurt, 2013)	This research tested attitude in education supported environment using UTAUT.	The finding of the research indicated that anxiety as an important predictor in computer supported environment
(Chuo, & Tsai, 2011)	The purpose of the study is to develop the usage intention model of e-learning systems.	The finding shown that anxiety found as important an predictor for e-learning.
(Rahimi & Yadollahi, 2011)	This study was to determine computer anxiety when integrating ICT in classes	The study found computer anxiety and ICT integration. Has negative correlation
(Cazan et al., 2016)	This research focused on examining computer anxiety and self-efficacy when using the computer and the attitude towards the internet on a sample comprising Romanian high-school and university students.	The study found the importance of the anxiety toward the internet and computer use.

2.4.8 Self-efficacy

Computer self-efficacy (CSE) can be defined as capableness to adequately use computer technology in doing jobs. Computer self-efficacy (CSE) refers to the degree of competence believing having the capability ability using computer. (Thatcher et al., 2007) identified twenty items as the basic ICT skills which include ability to use Internet, applications software and trivial computer maintenance. It was found that there was a significant impact of social influence on behavior intention that then affect the students' acceptance of web based learning system (Din & Wang, 2009). The UTAUT was validated Sundaravej (2010) confirming the significant effect of self-efficacy on the behavior intention.

Self-efficacy was also found as one of the significant determinants in e-Government services user acceptance (Norazah & Ramayah, 2010). According to Deborah & Higgins (1995) CSE and IT used to have positive relationship. As reported in Higgins (1995)

Bandura has developed a reliable and valid measurement based on 10-item to assessed CSE and when tested on ICT implementation identified CSE as an important factor (Ritu & Karahanna, 2000).

There is positive effect of self-efficacy on the intention behavior to use towards the actual usage for the technology throughout the positive effect on PU and PEOU by the employees and managers (Al-Haderi, 2013). In addition, factors such as computer self-efficacy, advantages relativeness, compatibility and prior computer experience are significantly influencing the PEOU and attitude towards using educational technologies (Surej, 2015). Also self-efficacy mediates the relationship between learning satisfaction and ICT usage, and that ICT usage and social capital both predict increases in subjective performance (Kuo et al., 2013). Computer self-efficacy (CSE) linked to computing behavior and usage behavior is normally influenced by perception (Agarwal & Karahanna, 2000). In ensuring success of systems implementation, it is important to understand CSE effect on IT use.

Table 2.8: The Usage and Effect of Self-Efficacy on ICT

Author	Description	Findings
(Din & Wang, 2009)	The study is on web-based learning system student acceptance	The study found that self-efficacy has significant influence on behavior intention.
(Sundaravej, 2010)	This paper investigate UTAUT in an educational technology environment	The findings highlight the significant effect of self-efficacy on the behavior intention.
(Al-Haderi, 2013)	The study is to study culture and technology acceptance	The study proved that self-efficacy has significant effect on the behavior intention.
(John, 2015)	This study is on the integration of information technology in higher education which looked at the faculty's attitude towards IT adoption in the teaching process.	The study identified self-efficacy affect technology use
(Suki & Ramayah, 2010)	This paper identified e-Government services acceptance factors using UTAUT	The study found that self-efficacy influenced the intention to use e-Government services/system.
(Kuo et al., 2013)	The study studied the critical success factors for motivating and sustaining women's ICT learning.	The result shows the importance of self-efficacy toward technology.

2.4.9 Availability of Time

In a study by Afshari et al. (2009) to identify used of ICT factors among teachers and found that time is consider the most critical factors affecting students and lecturer in developing ICT skills and that the availability of time to use computers was found to affect use where almost 60% of students as research respondents reported that they would use the computers more if they had more time (McMahon et al., 1999).

Another important factor to develop ICT skill is the availability time to learn ICT and web tools (Shabrina & Aziah, 2015). Availability of time determines ICT used in teaching and learning (John, 2015). Lack of time available in classes, and in teachers' own schedules for planning is a major factor influencing ICT integration in teaching. Furthermore, with the busy school schedules had attributed both teachers and students to have little time to work on integrating ICT in other subjects. The availability of time by

students and lecturer is important to the acceptance of ICT and that the lack of time is considered as one of the barrier to use the ICT system (Megameno, 2010).-Prior studies indicated that students had to struggle to find time to learning how to use Learning Management System (LMS) tools while at the same time they need to keep up with the other requirements of their studies (Nastaran, 2015). Participating in online learning activities was seen as another burden on time and lecturers were also concerned about the time needed to organize their learning materials, to learn how to use the tools efficiently, and to be actively involved with either synchronous or asynchronous online discussions.

Table 2.9: The Usage and Effect of Availability of Time on ICT

	Description	Findings
(Livingstone, 2015)	This study investigated ICT used in teaching	This study showed the importance of – available time in learning ICT.
(Megameno, 2010)	This study investigated electronic information services (EIS) used in campus	The study confirmed the importance of availability of time for students to ~~t~~ adopt ICT.
(Zanjani, 2015)	This study to identify the engagement factors of lecturers and students with the e-learning tools provided by learning management systems in a higher education institution.	The findings of the study highlight time.as the important factor
(Shabrina & Aziah, 2015)	This research argued that the usage of the blended learning web tools could address the concern of the student-centered learning in the Malaysian Institute of Accountants (MIA) accredited universities	This study found that it is important ~~of~~ that there is available time dedicated to learn ICT and web tools.

2.4.10 Performance expectancy

Performance expectancy referred to the expectation and belief that performance can be attained and work can be performed better when using ICT (Mohammadyari & Singh, 2015; Venkatesh et al., 2003). Prior researches had shown that performance expectancy and its related constructs are the strongest predictors of behavioral intention; for instance, Davis (1989) wrote that the extent to which people believe that a certain application is going to help them perform their job better influences whether or not they will use a

certain application. It was also acknowledged in prior researches that the achievement of valued outcomes, such as increased payment and improved job performance as important motivations for using technologies (Kaasenbrood, 2013). However, gender and age as treated as moderator as suggested by many studies (Venkatesh et al., 2003). In addition, ICT competency is added as a moderator between the relation of performance expectancy and behavioral intentions.

In relation to ICT skill in the social media studies it was found that social influence significantly affects students' intentions to use Social Network site (SNS) for expressive participation in Internet social movements (Borrero et al., 2014). Hövels (2010) found that hedonic performance expectancy to have positive affect on attitude towards the mobile application and the use behavioral intention.

Behavioral intention is significantly affected by performance expectancy, social influence and facilitating conditions (Raman et al., 2015). Wang et al. (2009) suggested that the existing models technology acceptance constructs of performance expectancy: perceived usefulness (TAM/TAM2 and C-TAM-TAB), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT) and outcome expectations (SCT) where performance expectancy is found to be the strongest predictor of behavioral intention to use ICT. Adapting m-learning suggest that m-learning useful as it allow teaching and learning activities to be done fast and flexible.

According to Shafi & Weerakkody (2010) performance expectancy contains five variables: performance expectancy, extrinsic motivation, job-fit, relative advantage and outcome expectations. that the influence of performance expectancy on BI to use Internet technologies is moderated by gender while Yahya et al. (2012) discovered that performance has significant effect on user acceptance of ICT. Lakhal & Khechine (2016) found that performance expectancy (PE) positively affects BI to use desktop web-conferencing. In the

m-health studies, Hoque & Sorwar (2017) highlighted that performance expectancy had a significant impact on the users' BI to adopt m-Health services.

Table 2.10: The Usage and Effect of Performance expectancy on ICT

Author	Description	Findings
(Raman et al., 2015)	This study investigated the technology acceptance level through UTAUT model.	The results revealed behavior intention and performance expectancy
(Wang et al., 2009)	Investigating age and gender in the mobile learning acceptance	The study confirmed performance expectancy as one of the predictor factors in mobile acceptance.
(Al-Shafi & Weerakkody, 2010)	This study investigated the e-government adoption factors	The study found that performance expectancy have any effect on e-government adoption.
(Gupta et al., 2008)	The study researched on the adoption of ICT in a developing country government agency	The study found gender moderates performance expectancy and behavioral intention use of Internet technologies
(Yahya et al., 2012)	The research examined E-Syariah portal user acceptance	The research found that performance has significant effect on user acceptance.
(Lakhal & Hager, 2016)	The study examined the predictive value of some factors on acceptance and use of desktop web-conferencing by students in a blended course, and according to course delivery modes, in higher education.	The study highlighted that performance expectancy does positively affects behavioral intention.
(Rakibul & Golam, 2017)	The objective was to develop m-Health for elderly users using UTAUT	The study found behavioral intention significant impact on performance expectancy

2.4.11 Effort Expectancy

The effort expectancy construct and its moderator variable has been extensively explained in the body of the literature. Effort expectancy can be referred to as aspiration of ease using technology (Park et al., 2015). Venkatesh et al. (2003) postulated effort expectancy affects behavioral intention and will be moderated by gender, age and experience; hence, effort expectancy is added as extended moderator factor to ICT skill

competency. An application system can be perceived as easy to use if he believes it is easy to operate and need less effort to understand the apps functionality (Ivanov, 2006).

Effort expectancy has been discussed are perceived ease of use (TAM/TAM2), complexity (MPCU) and ease of use (IDT) where effort expectancy was the important determinant of behavioral intention to use m-learning. Other factors that are affecting the intention to use e-learning was found to be perceived usefulness, perceived ease of use, perceived quality of service, perceived self-efficacy, and facilitating conditions and that these TAM variables do affect the students' ICT skills (Wit et al., 2014). Faizan et al. (2016) found in his study that effort expectancy as an important factor for the acceptance of computer in hospitality and tourism.

When a student perceived that ICT is easy to use it then make ICT acceptance easier. And treat the computer as useful instrument having control over the computer, developing his Internet competence, and able to develop a website have indicated mastery level of basic ICT skills (Akbar & Morteza, 2012). Usage of intranet is influenced by perceived ease of use Lee & Kim (2009) and effort expectancy had a significant impact on the users' behavioral intention to adopt m-Health services (Rakibul & Golam, 2017).

Effort expectancy was found significantly influence behavioral intention in predicting of open data technologies Zuiderwijk et al. (2015) and intention to use the E-Syariah portal (Yahya et al., 2012). However, in contrast, the study by Lakhal & Hager (2016) found that effort expectancy had insignificant effects on the behavioral intention to use desktop web-conferencing.

Table 2.11: The Usage and Effect of Effort Expectancy on ICT

Author	Description	Findings
(Wang et al., 2009)	The study was done on investigating the mobile learning. acceptance factors	The study m-learning. determinants of behavioral intention to use
(Althunibat, 2015)	The study aimed at determining m-learning factors and intention to use	The study discovered that effort expectancy affect the intention to use e-learning.
(Allahyari & Ramazani, 2012)	The study investigated TAM in an organizational acceptance	The study found that ease of use affect the acceptance of ICT.
(Wit et al., 2014)	This research focused on Internet and ICT skills	The study discovered that Effort expectancy among gender does affect ICT skills.
(Lee & Kim, 2009)	This study reports on an investigation organizations intranet use using TAM	The study indicate that usage of intranet is influenced by perceived ease of use.
(Hoque & Sorwar, 2017)	The aim of this study was to develop m-Health services for elderly users using UTAUT.	The study proved that adoption of m-Health services. Is affected by effort expectancy
(Lakhal et al., 2013)	The aim of this study was to examine the predictive value of some factors on the acceptance and use of desktop web-conferencing by students in a blended course,	The study found that desktop web-conferencing used was affected by effort expectancy
(Zuiderwijk et al., 2015)	The study was to investigate acceptance of open data technologies	The findings shown that effort expectancy was found to be significantly influencing behavioral intention.
(Yahya et al., 2012)	The study examined E-Syariah portal user acceptance	The study proved that effort expectancy has significant effect on the intention to use the portal.

2.4.12 Social Influence

Social influence (SI) can be referred how ICT can be leverage to influence use by the user to make changes (Maillet et al., 2015) and that SI is affects behavioral intention. Venkatesh et al. (2003) assumed that gender, age, voluntariness, and experience affected by social influence on behavioral intention in addition to the UTAUT moderators where ICT competency was added as an extended moderator to social influence. The social influence construct and its moderator variable have been extensively explained in the body of the literature. Edublogs has been integrated in the digital teaching and learning environment and that performance expectancy, social influence and facilitating

conditions have significant positive effect on behavioral intention in using ICT (Raman et al., 2015). In another study by Hunsinger & Smith (2008) it as found that factors that attitude, subjective norms, and perceived behavioral control, are significant in predicting behavioral intention to pursue ICT certification while social influence was found as significantly influencing behavioral intention (Zuiderwijk et al., 2015) . It has also been revealed that social influence has a positive impact the use of the ICT (Gupta et al., 2008), intention to use of E-Syariah portal Yahya et al. (2012) and behavioral intention to use Sriwindono & Yahya, (2012) of desktop web-conferencing (Lakhal & Hager, 2016).

Social influence also significantly affects students' intentions to use SNS for expressive participation in Internet social movements. Social influence affects students' acceptance and computer used in supported collaborative classrooms (Faizan et al., 2016). Subjective norm is affect intention, but it can be leverage by increasing age, and experience using computers (Al-Gahtani et al., 2007).

Table 2.12: The Usage and Effect of Social Influence on ICT

Author	Description	Findings
(Raman et al., 2015)	The main purpose of this study is using UTAUT model to investigate level of technology acceptance level	The results revealed that Behavioral Intention.is affected by social influence
(Hunsinger & Michael, 2008)	The study investigated IT certification choice factors	It was found that behavioral intention to pursue IT certification is affected by social influence
(Zuiderwijk et al., 2015)	The research aimed to investigate open data technologies predictors	Social influence was found significantly influence behavioral intention.
(Gupta et al., 2008)	The research investigated the government agency ICT adoption	The study found that social influence positively impact the use of the ICT.
(Yahya et al., 2012)	The study examined E-Syariah portal user acceptance	The study found that social influence affect E-Syariah portal intention to use
(Borrero et al., 2014)	The study aimed to look into technology readiness	The result of the study confirmed that social influence significantly affect students' intentions to use SNS.
(Al-Gahtani et al., 2007)	The research investigated Information technology (IT) culture and the acceptance and use of IT in Saudi Arabia in terms of	The result showed that subjective norm positively influences intention.
(Faizan et al., 2016)	The study was on an assessment of students' acceptance and usage of computer supported collaborative classrooms in hospitality and tourism schools.	It was found in the study that social influence s as one critical factor.

2.4.13 Facilitating Conditions

Facilitating condition refers to the organization readiness and existing technical infrastructure to support use of the technology (Parameswaran et al., 2015; Venkatesh et al., 2003). Prior researches indicated the direct influence of facilitating conditions on intention to use. Venkatesh et al. (2003) suggested age and experience to moderate the facilitating conditions influence on intention to use. ICT competency added as extended moderator to facilitating conditions influence on the intention to learn ICT skills. Facilitating conditions construct and its moderator's variables have been extensively

explained in the body of the literature such as the work of Althunibat (2015) and Raman et al. (2015).

Determinants such as effort expectancy and facilitating conditions positively predict tablet use intentions with controlling factors age and gender (Kate et al., 2015). Good facilitating conditions contributed towards high level of ICT acceptance (Bassam, 2012; Akbar, 2013). The presence of both performance expectancy constructs and effort expectancy makes facilitating conditions predicting intention becomes insignificant indicating that the insignificant influence of facilitating conditions on behavioral intention (Venkatesh *et al.*, 2003; Zuiderwijk et al., 2015) and that faciliting condition does not have any affect on on the intetion to adopt m-health (Rakibul & Golam, 2017).

Table 2.13: The Usage and Effect of Facilitating Condition on ICT

Author	Description	Findings
(Althunibat, 2015)	The study is done to determine factors affecting m-learning in higher education.	The study found that facilitating condition have a significant affect e-learning. intention to use
(Raman et al., 2015)	The main purpose of this study is to investigate the level of technology acceptance	The study found facilitating conditions positively affect on behavioral Intention.
(Zuiderwijk et al., 2015)	The study investigated open data technologies acceptance using UTAUT	It was found that facilitating condition had insignificant influence on the behavioral intention.
(Hoque & Sorwar, 2017)	The study aimed to develop a theoretical model based on the UTAUT and then empirically test it for determining the key factors influencing elderly users' intention to adopt and use the m-Health services.	The finding of this study indicated that facilitating condition have no affect on the intention to use m health.
(Magsamen-Conrad et al., 2015)	This study examine use of tablet devices across multiple generations.	The study after controlling age and gender found positive relationship between facilitating conditions and use intentions

Table 2.13: Continued

Author	Description	Findings
(Akbar, 2013)	This study was to find out what affect student to use and accept technology.	The study shown that facilitating conditions has significant affect on technology used.
(Ma et al., 2016)	This is study investigated the personal factors affecting smartphone technology acceptance by elderly Chinese adults.	The findings indicated that facilitating condition is a significant predictor.
(Faizan et al., 2016)	The study did an assessment of students' acceptance and usage of computer supported collaborative classrooms in hospitality and tourism schools.	It was found that there is positive affect of facilitating condition on acceptance and usage of computer in supported collaborative classrooms

2.4.14 Behavioral Intention

Behavioral intention (BI) to use ICT refers to purpose that motivate to use the ICT systems and applications. In this research, BI is referred to the likelihood to use ICT systems and services (Ángel et al., 2014) in a given behavior (Patricio et al., 2015).

Behavioral intention involves influence factors to motivate behavior indicating the planning purpose and effort to act in that certain behavior. Behavioral intention to use affect actual use hence prediction of behavior on behavioral intention can be determined (Karaali et al., 2011; Patricio et al., 2015). The strength of one's intention to perform a specified behavior can be assessed using behavioral intention scale (Fishbein & Ajzen, 1975; Malhotra & Galletta's 1999). Davis et al., (1989) used a self-report measured in terms of time and frequency of adopting ICT application.

The view of Venkatesh et al. (2003) and Williams, et al. (2015) on behavioral intentions is in agreement with discussion of prior intention models and as expected behavioral intentions is positively affecting the intention to use the technology. UTAUT theorized that behavioral intention and facilitating conditions helped to predict the use intention.

A TRA adaptation by Davis (1986) indicating the behavioral intention probability while Fishbein & Ajzen, (1975) defined TRA behavioral intention as strength to perform a specific behavior. According to Davis et al. (1989), determinant of actual system use is determined by perceived usefulness and perceived ease of use of the system indicating that the main determinant factor to technology acceptance is behavioral intention (BI). High level of intention to use ICT motivate willingness to use the computer system indicating that the single best predictor of actual system usage is behavioral intention to use is (Davis & Venkatesh, 1996).

By measuring intention to use TAM gained its ability in predicting ICT systems' acceptance or intention to use ICT services like online courses (Selim, 2003) determined by PE and PEOU where the relationship of these constructs were found to be positive (Ong & Lai, 2006; Davis, 1989; Davis et al., 1992; Fusilier et al., 2005; Ngai et al., 2007; Saad & Bahli, 2005; Selim, 2003; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). Computer anxiety positively affect learning purposes of computer technology use intention (Compeau & Higgins, 1995) and internet-based learning medium intention to use (Lee et al., 2005).

In summary, there need to be internal and external factors investigation modelling factors that affect acceptance of ICT technology. In this research, the behavioral intention, perceived ease of use and perceived usefulness and factors affecting and influencing ICT acceptance has been thoroughly examined.

Table 2.14: The Usage and Effect of Behavior Intention

Author	Description	Findings
(Patricio et al., 2015)	The research analyzed an innovative model to explain behavioral intention to use mobile Internet, using as antecedents the operating system of smart phones, self-image of respondents and price value, taking into account gender as a moderator variable.	The study confirmed the importance of the behavior intention.
(Karaali et al., 2011)	This study identified factors affecting web-based learning system acceptance	The findings of the study indicated the relation between the behavior intention and the actual use.
(Ángel et al., 2014)	This research looked at behavioral intention, use behavior and the acceptance of electronic learning systems by comparing higher education and lifelong learning	The findings of the study stated that behavior intention was considered as the proxy of actual use.

2.4.15 Behavior Use of ICT

UTAUT tested that use behavior abled to predict behavioral intention and facilitating conditions. A critical TAM reviewed by Legris et al. (2003) found that from twenty-two (22) studies only eleven (11) studies actually measured use behavior by self-reporting while only one (1) study used automatic measuring system logs tool to measure use behavior (Venkatesh et al., 2003). Thirty-seven (37) UTAUT studies were analyzed using meta-analysis by Ayankunle & Alan (2013) confirmed that the behavioral intention and behavior use (BI-BU) correlation were only reported by thirteen (13) of these studies.

2.5 Gap Analysis

The discussion on this section will be done in relation to the development of Figure 2.2 which presented the conceptual framework for this research. The elements for this research is an attempt to bridge current literature gap by investigating the factors affecting student's ICT skills as well as to identify significant impact of these factors and from there proceed to build a framework that can predict the students' ICT skill. Hopefully, this predictive toll helps to increase the body of knowledge of the related current literature reviews.

The design of the framework in Figure 2.2 is based on the factors discussed earlier and these factors are then categorized based on (i) external variables which include attitude, anxiety, self- efficacy, availability of time), (ii) UTAUT internal variables consisting of performance expectancy, effort expectancy, social influence and facilitating conditions and (iii) moderating factors are ICT competency, age, gender, experience and voluntary of use.

Currently there are many studies conducted in the ICT fields; such as to determine student's ICT level (Wit et al., 2014), ICT and e-learning study (Kuo et al., 2013), the effect of ICT outside of school (Pitikorn & Jon, 2013), ICT self-efficacy (Aesaert & Johan, 2014), ICT adoption in rural area (Moghaddam & Khatoon-Abadi, 2013), attitude toward computer personal usage (Abedalaziz et al., 2013; John, 2015; Fančovičová & Pavol, 2008; Opoku & Alfred, 2014), ICT competence (Aesaert & Johan, 2015; Aesaert et al., 2015; Kurt De Wit et al., 2012), ICT adoption (Nurhidayati & Herlina, 2015), implementing PC tablet in school (Hakan & Murat, 2014; Kate et al., 2015), factors affecting digital skills (Faizah, 2013; Naufal & Amat, 2015; Giulia & Davide, 2014; Jara et al., 2015) and ICT and mobile learning (Gumus, 2013; Verhoeven et al., 2014; Althunibat, 2015) and ICT acceptance (Allahyari & Ramazani, 2012; Raman et al.,2015).

ICT competence is a the capability, capacity, proficiency and expertise in tasks executions completed on time and the required quality standards (Nahyun Kwon & Hana Song, 2011). The following studies shows the importance of the ICT competence. Aesaert & Braak (2015) studied the level of ICT competency among primary school children where assessments of the students' competency indicated that the problem of communicating acceptable by the norm social standard. Ability to access computers also contributed towards ICT competency where the student can be vigorously pursued using computers hence improving their ICT competency (Kuranchie, 2014).

ICT used UTAUT widely as model for technology acceptance. Since its development in 2003 by Venkatesh et al., the model has been broadly and largely in many research fields including education. The theorizes that performance expectancy (PE), effort expectancy (EE) and social influence (SI) influence the behaviors intention (BI) and facilitating condition (FC) influence intention to use. Performance expectancy (PE), effort expectancy (EE), Social influence (SI) and facilitating condition (FC) were considered as the main important key determinants of the intention to use technology. Other factors that include Gender, Age, Experience and Voluntariness of use also have moderating effects on the acceptance of IT.

UTAUT explained 70% of the variation in usage intention (acceptance) of technology which is greater than each of the eight previous models and their extensions (Venkatesh et al., 2003) and that UTAUT objective is to provide the computer acceptance determinants explanation and behavior of user of ICT (Terzis & Anastasios, 2011). Referred as a synthesized model, UTAUT was able to display comprehensive process of acceptance (AlAwadhi & Morris, 2008). UTAUT merged the construct a holistic model of acceptance by integrating 8 different models having disparate origins in psychology, sociology and communications. These models include TRA, TAM, TPB, the Motivational Model (MM), the combined TAM and TPB (C-TAM-TPB), the Model of PC Utilization (MPCU), DOI and Social Cognitive Theory (SCT). Each of these model had the similarity of explaining and predicting user behavior and UTAUT integrate these models into a unified model (Venkatesh et al., 2003; Williams et al., 2015). The UTAUT model has formulated four main effects and four moderators extracted from thirty-two variables from the eight models (Venkatesh et al., 2003). UTAUT is widely used now as a benchmark for the technology acceptance (AlAwadhi & Morris, 2008).

Prior researched that explored UTAUT model using organizations data (Sancaka, 2015; Venkatesh et al., 2003) supported that facilitating conditions affect behavioral intention to use technology (Venkatesh et al., 2003) using moderator factors. These gender, age, experience, and voluntariness of use. Many studies have extended the UTAUT to include additional factors (Bhatiasevi, 2015; Slade et al., 2015; Yueh et al., 2015). This research attempts to extend UTAUT suggestion to include additional external variables, as well as additional moderator factor to improve ICT acceptance knowledge and understanding. This research attempted to add additional moderator factors to study their effect on the relation between independent variable and dependent variables.

As ICT is emerging as a main driver for employments and personal development it seems important to identify the factors affecting ICT skills to understand the reason and barrier towards student's ICT skill and whether these factors can be predicted in advance. In general, it can be said that students' ICT skill is related to the ICT usage by the students and is made complicated due to the existence of various factors with the presence of multi-dimensional phenomenon that demand being investigated. In doing so, age, gender, attitude, anxiety, self-efficacy, availability of time, performance expectancy, effort expectancy, social influence and facilitating conditions are among the factors that have been studied.

The successful use and implementation of ICT in various fields also demands people to be enough skill and willingness to use ICT tools and services in their daily tasks. Even though higher learning institutions (HEIs) have included ICT courses in the curriculums, overcoming the barriers to accept ICT can improve the rate of developing skill talents in ICT. Therefore, by identifying the factors affecting students' ICT skills is an opportunity to overcome and minimizing the barriers in developing ICT skilled among HEIs students. In addition, the framework is developing to help to predict the factors that affect student's

ICT skill whereby by knowing these factors the HEIs can develop strategy to minimize the factors and to develop better strategy to embed ICT in the teaching and learning process of ICT.

In the following chapter that discussed on the research methodology, a well-designed survey questionnaires being the research instrument (i.e. the survey) was developed to capture the accurate, important and relevant data as evidence for the following conceptual framework as shown in Figure 2.7. The construct of the framework consists of external variables which include attitude, anxiety, self- efficiency, availability of time, UTAUT internal variables consisting of performance expectancy, effort expectancy, social influence and facilitating conditions and moderating factors are ICT competency, age, gender, experience and voluntary of use.

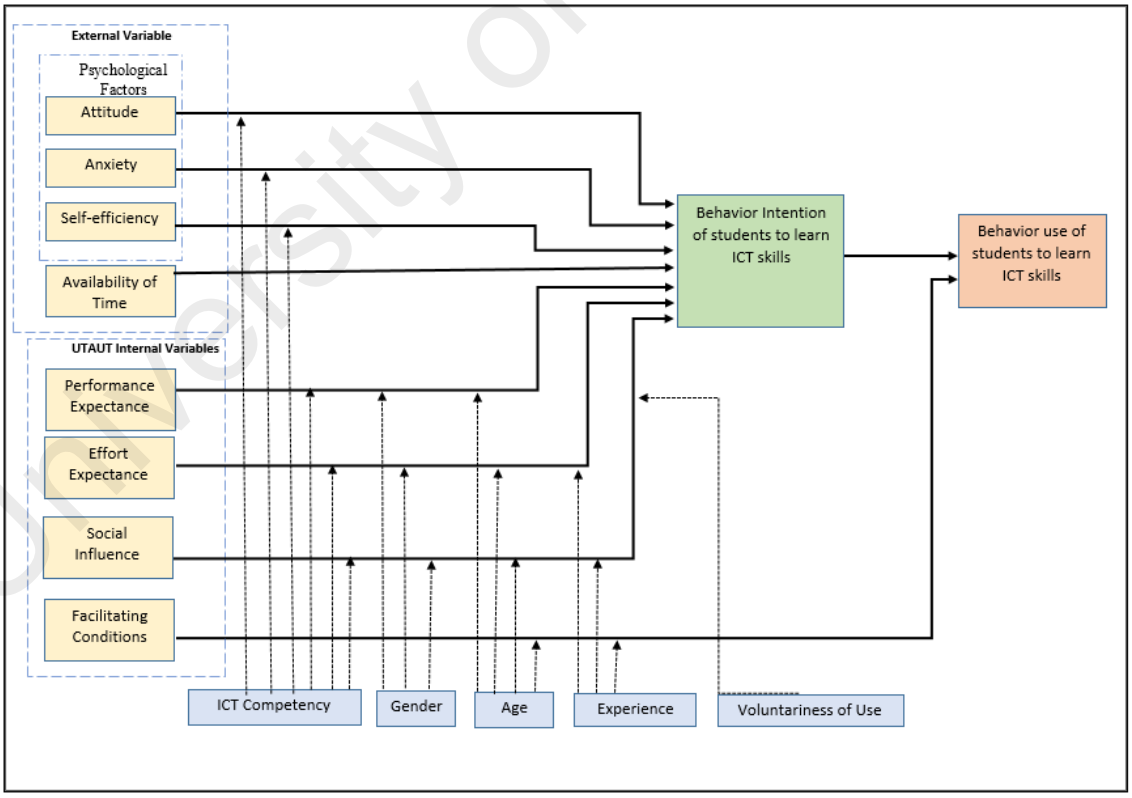

Figure 2.7: Research Conceptual Framework

The research conceptual framework was developed based on the hypothesis developed in Chapter 1 and the literature review done in Chapter 2. The factors studied in Chapter 2 is then embedded into the UTAUT model to form the research conceptual framework.

ICT has brought so many changes to our life. Teaching and learning activities are more interesting and more meaningful as ICT provides the element of interactivity that was never thought of before. ICT is one of the most important determinants of various industries' eventual success in the world. (Hussein et al., 2010). ICT skills are considered as one of the most important requirement for employment (Bello et al., 2013) However, the maybe some situation where minority of students resist to learn ICT or facing ICT skills issue; therefore, it is necessary to understand what prevents them from learning ICT skills. There may still potential barriers affecting the students to learn ICT skills in a larger scale.; thus, this study helps to fill that gap in the literature.

It is hope that this research makes several contributions towards the body of related literature. This research was divided into several phases; firstly, it dealt with the basic student's ICT skills; secondly, this research will conduct ICT competence to evaluate student's ICT skills level and to use this ICT competence as a moderator factor; and finally an attempt to extend UTAUT as a research model will be done to include factors no studied in earlier researches.

2.6 Summary of the Chapter

This chapter has excessively looked at the literature review relating to this research. We have looked at the previous ICT studies, the acceptance models and theories that we are going to use in our study. In addition, the chapter had also discussed the factors affecting students' ICT skills discussed in the prior researches.

At the end of the chapter the gap analysis had also been discussed. In the next chapter we are going to discuss the research methodology that we used in this research.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The methodology presented in this chapter attempt to answer the research questions of this study as stated in Chapter 1 which include what are the factors affecting student's ICT skills, how will these factors and their moderating variables gives impact on the on the student's ICT skills, and how to develop a model to determine the factors affecting students' ICT skills.

The research methodology chapter also covered the details of the activities that are targeted toward achieving the research objectives. This methodology is divided into three phases, as shown in Figure 3.1: Phase 1- identification of the problem and analyzation of the gap, based on the literature review (LR); Phase 2 – involved the research instruments which include the design and implementation of the survey. This phase covered the research design, questionnaires design, pilot study, validity and reliability of the questionnaires and the research survey, and finally Phase 3 - analysis and result. This phase covered data preparation, data analysis, hypothesis testing and model building.

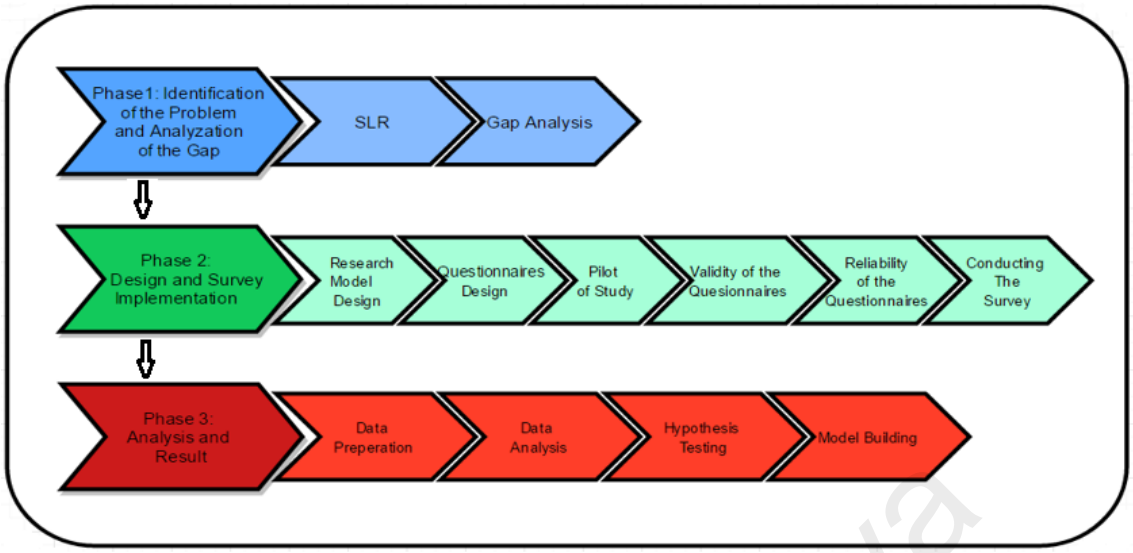

Figure 3.1: Research Methodology Phases

3.2 Phase 1: Identification of the Problem and Gap Analysis

Phase 1 presents the identification of the problem and analyzation of the gap. The literature review has been undertaken based on the original guidelines proposed by (Khan et al., 2003; Kitchenham et al., 2009). The five steps in this research literature review (LR) method are as follows:

3.2.1 Information Sources

Three digital databases were chosen to conduct the search for target articles: (1) the database offering access to science and technical journal articles ScienceDirect; (2) the technical literature in engineering and technology library IEEE Xplore and (3) the social sciences, arts and humanities Web of Science (WoS) service indexing cross-disciplinary research in sciences. In order to get a valid and highly cited sources to support this research.

Both science, social and technical literature is explored to provide a broader view of researchers' efforts in a wide, but relevant, range of disciplines.is the rationale behind the selection of literature covered.

3.2.2 Study Selection

The process of study selection consisted of searching the literature sources, followed by two iterations of screening and filtering. The first iteration excluded the duplicates and irrelevant articles by scanning the titles and abstracts, while the second iteration filtered the articles after a thorough full text reading of the screened articles from the first step. Both iterations applied the same eligibility criteria followed by the author who performed the screening and reviewing.

3.2.3 Search

The search was conducted at the start of September 2014, in ScienceDirect, IEEE Xplore and WoS databases via their search boxes. The researcher used a mix of keywords that contained "ICT skills", "ICT competence" and "ICT acceptance" in different variations, combined by the "OR" operator. The exact query text is shown in Figure 3.2. Various options in each search engine were used to search for relevant literature and to exclude book chapters and other types of reports other than journal and conference articles, as the researcher deemed those two venues the most probable to include up-to date and proper scientific works.

3.2.4 Eligibility Criteria

Every article that met the criteria listed in Figure 3.2 was included in this research. The research had set an initial objective of mapping the space of research on ICT skills into a general and coarse-grained taxonomy of four categories. These categories were derived from a pre-survey of the literature with no constraint (Google Scholar was used to obtain a first taste on the landscape and directions in the literature). After the initial removal of

duplicates, articles were excluded in both iterations of screening and filtering if they did not fulfil the eligibility criteria. Examples of exclusion reasons include: (1) the article is non-English; (2) the focus is not on the ICT skills; and (3) the objective is the technology development rather than ICT skills specifically.

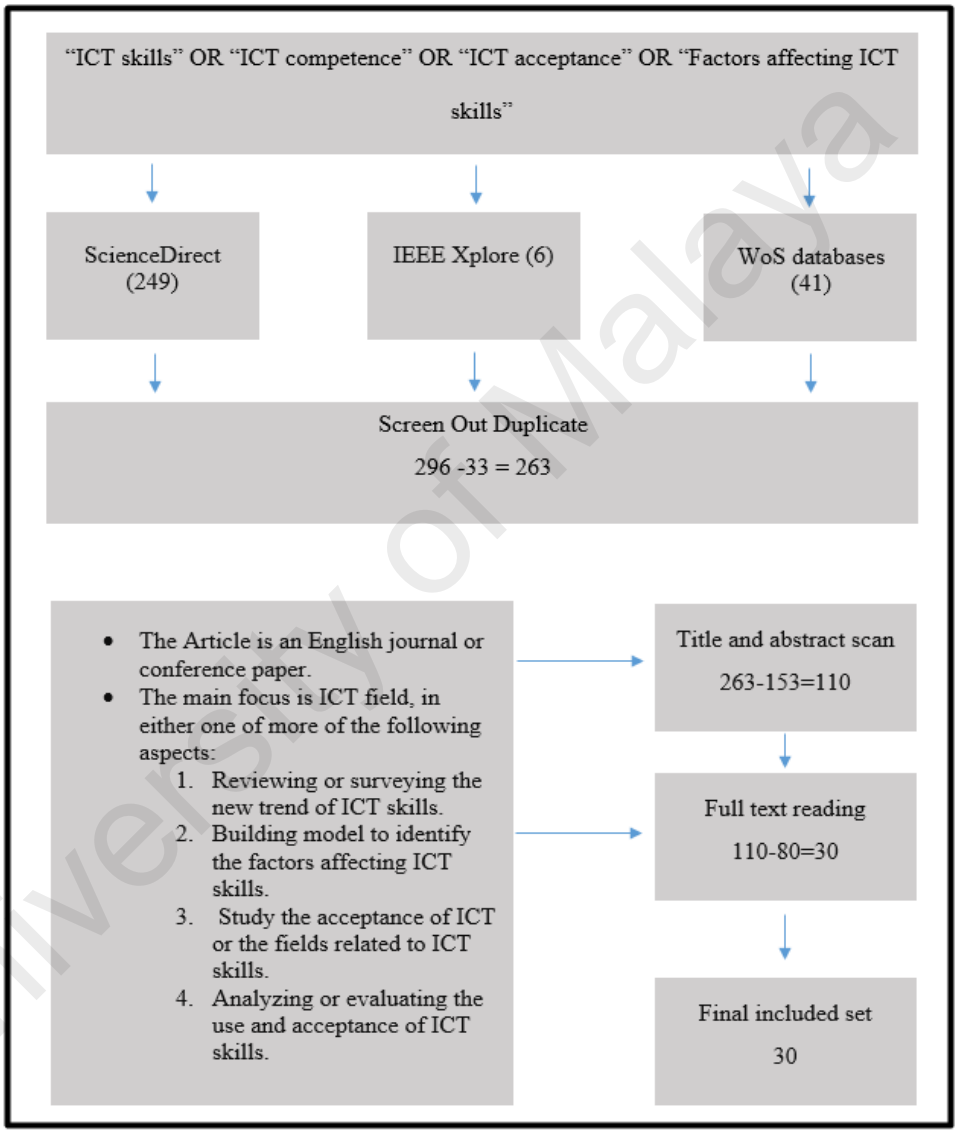

Figure 3.2: Analysis of Articles Selection

3.2.5 Results of Analysis of Articles Selection

Although ICT has been a topic of interest since the turn of the century, this preliminary query search resulted in 296 articles: 29 from ScienceDirect, 6 from IEEEXplore, and 41 literatures from WoS, over the span from 2007 to 2016. Thirty-three (33) redundant articles were dropped from these library databases. After scanning the titles and abstracts, 153 more articles were excluded, resulting in 110 papers. Full-text reading excluded 80 articles, leaving 33 articles in the final included set. Those papers were read detailed and carefully with the objective to find a general map for the conducted research on this emerging topic.

Upon completing the literature review (LR) process, the analysis of the articles being research were observed to have certain patterns. First, it was found that the articles collected were generally involving exploratory research. Next, most of the articles described the existence of ICT skills studies / researches. Following that, the next largest portion of articles found during the LR was found to be conducting various studies on ICT such as e-learning, m-learning, internet use and specific ICT application. Quite few researches were actually found to move along in initiative creating their own framework or shared their experiences in doing so. Finally, there was a small portion of works which include developments for frameworks or models that addressed the acceptance of specific applications.

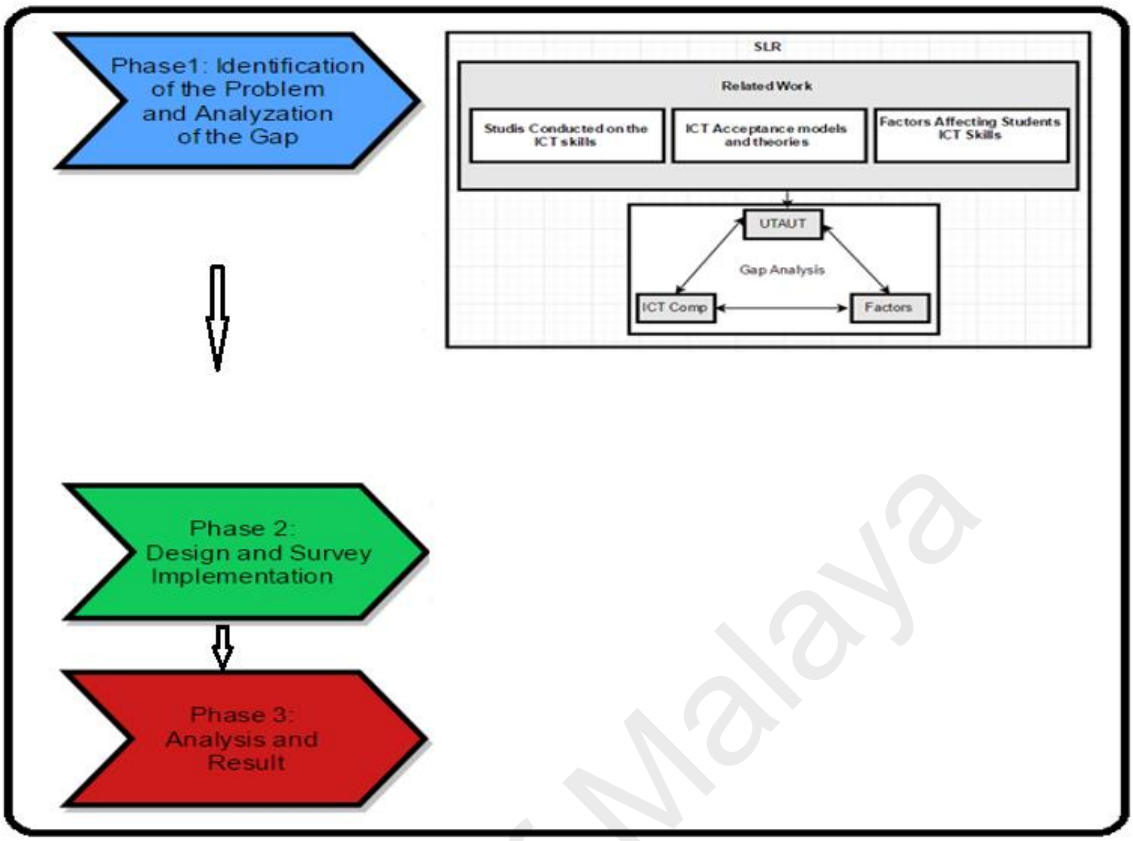

Figure 3.3: Phase 1 Process

3.3 Phase 2: Design, Development and Implementation of Survey

This phase illustrated this research process, procedures and methods used. It is organized under the following structure: methodology introduction, design of the research, data sampling, questionnaires design, pilot test, reliability and validity, and survey. The phase also outlined the research plan to answer the research question. This research employed quantitative research methodology using survey as the research instrument in order to examine the factors affect students' ICT skill at HEIs.

Due to its efficiency in collecting data, questionnaire allow what to ask and provide an avenue how variable can be measured for data relevancy and accuracy (Sekaran, 2006). Questionnaires takes time and planning to design to enable correct data can be capture by making the questions clear, readable and understandable by the survey respondents

(Oates, 2005). Once the questionnaires have been completed by the respondents it is then analyzed using specific relevant assessment method.

3.3.1 Research Framework

Researches can be experimental and non-experimental depending on the treatment of the intended variables. The objective of this descriptive research is to identify the factors affecting students' ICT skills and to report "what exists" from the situation. Creative exploration description emerged as research findings that is then tested and validated.

Mail, face to face, telephone, electronic mail plus a combination of these methods are different methods for data collection including postal (Michaelsen, 2007; Sekaran, 2006). A survey research aimed to provide statistical description and explanation of the phenomena or variables being studied (Ali, 2006). Variables are studied (Kerlinger & Lee, 1999) and inferences on the variables relationship done (Ali, 2006). In this research, survey method was chosen as it seems to be the most relevant and appropriate method to capture data in identifying factors affecting student's ICT skills. Survey is best used to study group behavior Briony Oates (2005) in standardized and systematic manner. A questionnaire, interview, documents, observation and paper-based questionnaire or electronic questionnaire that is gaining popularity (Yun & Trumbo 2000) can be component of a survey.

Considering survey as the best method of study as it has been made easy to use the format to collect information is standardized, able to make generalization, questions are systematic, availability of pre-established model to be tested making used of average responses that have high reliability.

As indicated in Chapter 2 the construct of UTAUT consists of user acceptance and usage behavior as the first determinants to the acceptance of ICT. Several prior researches

extended the UTAUT model to adapt to the research objectives and environment by including three constructs that were grouped to two groups to the UTAUT model including variables attitude, anxiety, and self-efficacy and availability of time.

The second determinant in this research is the availability of time. The constructs of the extended model in the prior researches based on the constructs from the initial theory as well as the proposed constructs of this research are related to the following:

(i) Performance expectancy referred to expecting and believing attaining the required performance and doing quality tasks better with use of ICT while

(ii) effort expectancy referred to as belief of ease using technology

(iii) Social influence referred to the perception importance to use ICT

(iv) Facilitating conditions referred to believing in the availability of ICT support existence of organizational and technical infrastructure.

In addition, this research has identified several factors as the moderating factors. The moderator factors are age, gender, experience, voluntary of use and ICT competency.

3.3.2 Population and Sampling of the Study

The target population of this research comprised the undergraduate students in the year 2015 at government and non-government sponsored public and private universities in Malaysia. According to Horst Stipp (2018), the total student's population in Malaysia public universities is 667490. The total number of the public universities were 18 and the private universities were 22 universities selected from the higher education institute of Malaysia website. Sampling method is applied in this research because it is difficult to obtain the exact students population frame (Sekran, 2000). The details of the population being studied is discussed further in Chapter 4 section 4.2.

As mentioned earlier, surveys enabled statistical generalizations of samples and the main survey sampling objective is sample population selection that represents the elements being investigated accurately. A simple random sampling method is used by this research due to its rigor and popularity and enable equal opportunity selection of samples. Sample population provides costs savings as well as better time management of research respondents and fast availability of results. Bad selection of samples can jeopardize the result and outcome of the study done.

There are two types of sampling: probabilistic and non-probabilistic. Probabilistic sampling is used when the sample selection for the research can be justified while non-probability sample indicate the uncertainty that the selected sample do represent the population studied. Depending on the size, large sample size enables statically generalization relationship to be drawn but the selection of sample size is depending on the nature of the research done and its complexity (Sekaran & Bougie, 2011). The population for this study are the 504 undergraduate students in Malaysia. According to Sekran (2000), if the popultion are 1 Million the minum size required is 384. Based on that the research used this sample 504.

3.3.3 Questionnaires Design

The instrument used for this study was a set of needs analysis survey questionnaire (refer to Appendix A). The questionnaire consisted of 48 questions divided into 3 parts: the first part of the survey relates to demographic details, the second part of the survey are the questions on ICT affecting factors and finally, the last part is pertaining to ICT competency questions.

A pilot study was conducted on 77 undergraduate students from the higher learning institutions (HEIs) to test the construct of the questions in terms of easy to understand and reliability of the questions. The questionnaire was then improved based on the feedback

of the respondents who participated in the pilot study (see section 3.3.4). In addition, three experts were also referred to validate the instrument (refer section 3.3.5). Pilot studies refers to mini versions of a full-scale study and is also known as feasibility' studies. The intention of a pilot study is to pre-test a particular research instrument such as a questionnaire.

Reliability test was conducted on the survey questionnaire for all items which registered a Cronbach alpha coefficient of .872 as shown in Table 3.3.6. UTAUT constructs and its extended factors such as psychological factors, availability of time and ICT competency identified in prior researches (refer Chapter 2) were use in developing the items for the survey questionnaire. The important procedure in organizing the questionnaires' survey is to have a clear and understandable instructions and also by stating the research purpose, required completion time and questionnaire section organization and type of questions.

For this research as mentioned earlier, the questions were grouped into three sections. Section 1 on demographic questions comprised two type of questions being multiple choice and choose from the list. Section two comprised questions based on the ICT affecting factors which include psychological, availability of time and UTAUT constructs. Section 2 questionnaires are measured using a five point Likert scale. Section 3 refers to ICT competency questionnaires which was in the form of multiple choice questions. Structuring the questionnaire well benefited for smooth process of the respondents to respond to the survey's questionnaires (William & Kreuger, 2003) avoiding confusion and uneasiness of respondents. Table 3.6 depict the questionnaire elements/ items.

Table 3.1: The Measured Factors and their Related Elements in the Questionnaire

Section	Factors Categories	No. Of items
1	Demographic	10
2	Attitude	4
	Anxiety	4
	Self-efficacy	4
	Availability of Time	4
	Performance expectancy	4
	Effort expectancy	4
	Social influence	4
	Facilitating condition	4
	Behavior intention	4
	Intention to learn ICT skills	4
3	ICT Competency	105

3.3.4 Pilot Study

A significant step in development of scales measurement is the pilot study as research instrumentations enhancement (Lin & Hsi-Peng, 2011). A pilot study helps improvement of the survey questionnaire by improving its readability and clarity, help to valid adequacy of proposed concepts being tested and avoid inconsistency thus improve questionnaire reliability.

In the pilot study of this research, the questionnaire was distributed to 100 students from Malaysian universities, the total number of the universities were 18. There were 85 questionnaires returned and usable while there was exclusion of eight questionnaires from the analysis due to respondent's incompleteness responses. The respondents of the pilot study were asked to make notes on the surveys of items (questions) that were unclear. The feedback given by the respondents were in the form of verbal and written feedback. Based on these feedbacks changes were made to improve the layout of the survey form and the phrasing of some survey questions. Several questionnaire items were modified to reflect more clearly the survey's purpose. The refined instrument was used in the main survey.

The reliability for all items was satisfactory with Cronbach's alpha above 0.70 and items loaded in the correct factors in confirmatory factor analysis with loadings of 0.70 or more. Therefore, the instrument was confirmed in terms of content validity and reliability.

3.3.5 Validity of the Questionnaires

Validity refers to legitimacy and soundness a test measurements and involved dynamic process grown by collecting evidence over a period of time that make it suitable and useful measure that determine the instrument measurement extension (Slavin, 1992).

The first draft questionnaire for this research was sent to three experts in Information System field in order to inspect for misleading question and to provide suggestion based on their expertise and also to determine that items in the questionnaire mapped and corresponded with the concepts being investigated. The preliminary English questionnaires was pretested using English editor to ensure clarity of questionnaire statements necessary to capture accurate responses. Once the responses of the pilot test were received, the questionnaire was redesigned to improve the content, simplify the survey to be understandable by the students as potential respondents of this research and reduced the questionnaire length to be manageable based on suggestions and feedback from the experts.

Table 3.2: Expert Feedback to Validate the Questionnaire

Area of expertise	Organization/Institute	Comments
Lecturer /Information System	University of Duhok, Iraq	Feedback given on the question style. Amendment on the questions were done based on the feedback given.
Lecturer/ Software engineering	Universiti Pendidikan Sultan Idris, Malaysia	There were no comments given in the feedback and everything was said to be alright.
Lecturer/Computer and information system	University of Pahang, Malaysia	Each construct should have four items. The amendment on the survey was done based on the feedback.

3.3.6 Reliability of the Questionnaires

Reliability is the extent of authentic and trustworthiness of the measures (Fink & Mark, 1995), consistent (Moskal & Leydens, 2000) and indicator's dependability (Bernard & Russell, 2012). Homogeneity or internal consistency important for reliability to exist as it assessed the questionnaires items and its attributes. Reliability check is done via Cronbach alpha level using Statistical Package for the Social Sciences (SPSS) Program as it computes internal consistency of items. Cronbach alpha having value of .70 and above is regarded as reliable and acceptable (Moskal & Leydens, 2000).

3.3.7 Conducting the Survey

After amending and updating following from the pretesting and piloting the questionnaire came the data collection implying to the distribution of surveys to the respondents. The questionnaire enclosed with a cover letter and three sections which include Section 1 the demographic information of respondents, Section 2 questions on the survey indicators of ICT affecting factors and Section 3 questions on ICT competency. A cover letter is an important component in the data collection process as it is the only avenue through which a researcher to encourage participants to participate in the study and respond to a questionnaire (Dillman, 2007). In order to establish credentials and

legitimacy the content of a cover letter for this study include the research objectives, significant of the respondents to participate in the study, duration taken to responds to the survey questions and that the data collected is for academic purpose. The identity of the respondents will be anonymous and confidential. The survey respondents for this research were undergraduate students in Malaysian universities (see Appendix A that show the cover letter and questionnaires).

Section 1 relates to demographic questions which consisted of ten multiple choice questions (MCQ) where the answers were displayed and the respondents can just have ticked and choose from the displayed list. Section 2 which investigated on the ICT affecting factors consisted of forty questions measured using 5 point Likert scale indicators reflecting on 10 constructs representing factors influencing acceptance of ICT skills. Some questions used Likert-scale items rated between 1 to 5 scales while some questions used Likert-scale items rated from Strongly disagree to Strongly agree. Section 3 investigated on students' ICT competency. In this section, the respondents were given an ICT test to determine their level of ICT competency.

Email invitations was sent to students via their universities emailing list to participate as the research participants and were given a link to the survey together with the consent form. The survey is used to measure the factors derived from previous studies as explained in Chapter 2. The web-based online survey remained open on the googledocs website for 4 days. The participants of this study include local undergraduate Malaysian students. The participating universities were selected from the higher educational institute website. This study targeted all the public universities in Malaysia. This research employed mail survey as it was able to attract immediate responses with grater response rates than web-based surveys (Louise & Lawrence , 2007). The participants were motivated by five ringgit (RM5) mobile credit (top-up) as a gift. The gift delivered to

them vis SMS as a top-up code after they filled the questionnaires. And the verification done through their mobile number which they should filling it in the survey form.

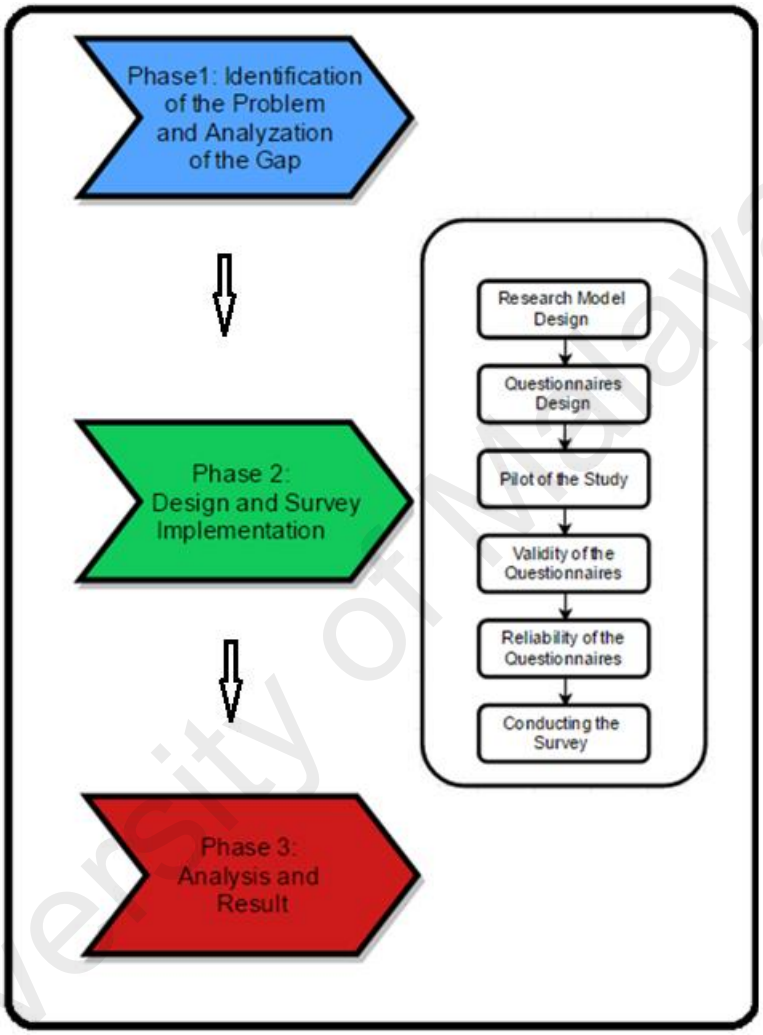

Figure 3.4: Phase 2 Design and Implementation of Survey

3.4 Phase 3: Framework Building

This phase explained the process of the model based on the outcome of the research analysis and findings. It essentially begins with the data preparation, data analysis, hypothesis testing and the final step is the model building (refer Figure 3.6).

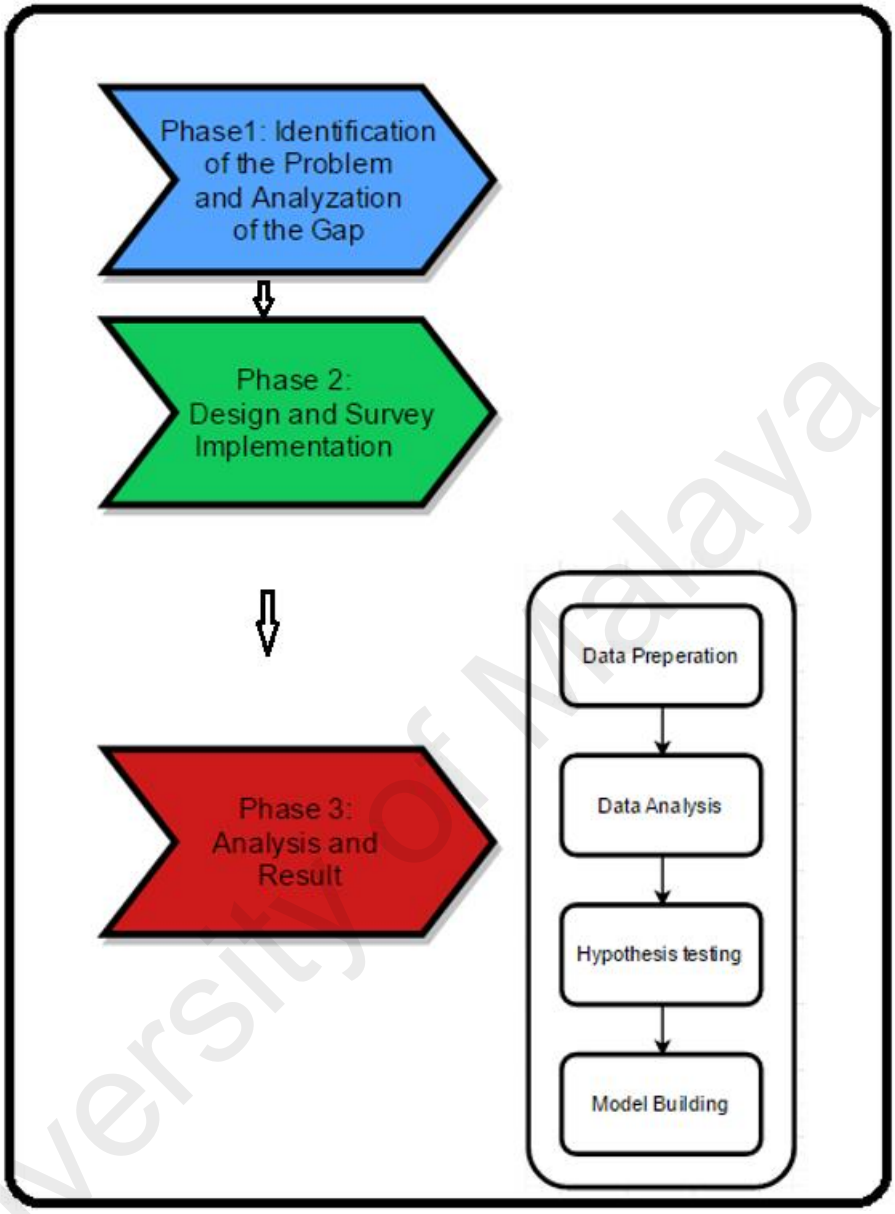

Figure 3.5: Phase 3 Model Building

3.4.1 Data Preparation

Before conducting the statistical analysis, it is important that make sure that the data collected is correct. It was necessary to perform the data preparation process which was used in this research which include questionnaire checking, editing, coding, data cleaning and data adjustment for data accuracy assurance. In addition, before selecting a data

analysis strategy this research also looked at missing data and performed the required treatment including examining the validity and reliability of the research constructs.

Data Cleaning and Screening: To ensure the validity and consistency of participant's responses, the study developed a data screening and cleaning procedure prior to data analysis. Levy (2006) noted that this pre-analysis procedure "deals with the process of deleting irregularities or problems with the collected data". During this process the completed questionnaire were checked for completeness and accuracy. The data were carefully entered and rechecked to avoid any data entry error. Then, all the items in the questionnaire such as demographic information, independent and dependent, as well as moderating variables were coded to dummy variable in (excel sheet). In statistics and econometrics, particularly in regression analysis, a dummy variable (also known as an indicator variable, design variable, Boolean indicator, binary variable, or qualitative variable) is one that takes the value 0 or 1 to indicate the absence or presence of some categorical effect that may be expected. It is necessary to reversed all the negatively worded questions so that researcher can ascertain that these questions are in the same direction with the positively worded questions in the questionnaire.

3.4.2 Method of Data Analysis

There exists several procedure towards data analyses phases. The first phase is analyzing the data from the pilot study that checked for the construct of the survey questionnaires followed by using merged data from the pilot study confirming the validity and reliability of the scales as the second phase of the data analysis.

The method for data analysis used in this study is PLS-SEM. it is very popular in many disciplines. The PLS-SEM offers an alternative to covariance-based SEM, which is especially suited for situations when data is not normally distributed. PLS path modelling

is referred to as soft-modeling-technique with minimum demands regarding measurement scales, sample sizes and residual distributions.

Before analysis, the data were coded using number of sequence. The research questions were coded using a 5-point Likert scale. Additionally, the demographic question such as gender and age were coded using dummy variables. The ICT competency test were coded to 0 or 1 according to the pass and failed students where 0 were represent failed students while 1 represented the pass students.

The purpose of this research was to analyze causal relationships between UTAUT constructs and external constructs such as physiological factors and availability of time. According to Memon et al. (2013) and Urbach (2010) causal relationships based on statistical data can be established using a statistical method for testing and approximating using a cutting-edge technique Structural Equation Modelling (PLS-SEM) to estimate multiple dependence relationships.

Although there exists numerous statistical models and algorithms to provide explanation of variables relationship prediction and estimation (Ringle & Mena, 2012) yet SEM enable considerations of independent and dependent variables concurrent relationships (Michael & Andreas, 2004; Urbach & Ahlemann, 2010) such as applying PLS SEM techniques (Rouse & Corbitt, 2008) known as second generation multivariate analysis techniques as opposed to techniques of first generation that include analysis of factors, analysis of discriminants and multi regressions in addition to supporting difficult modelling or measure of theoretical constructs of latent Variables (LVs).

Consideration of different inner and outer sub-models Urbach (2010) and Wong & Ken (2013) consists of LVs relationships. The structural model or inner model encompasses LVs relationships. Anxiety, self-efficacy, availability of time, performance

expectancy, effort expectancy, social influence, and facilitating conditions in UTAUT model are considered independent LVs while behavioral intention and behavior use are dependent LVs.

A complete SEM consists of structural and measurement models combination (Ringle et al., 2012; Urbach, 2010). Path coefficients measured variables relationships can determined by formative constructs weights or reflective constructs loadings. There exists different criteria for partial model structures assessing criteria and systematic application normally done via models measurement assessment and structural model assessment two-steps process (Götz et al., 2010).

The Measurement Model: Model measurement testing internal consistency reliability, indicator reliability, convergent validity, and discriminant validity by applying standard rules known as model of reflective measurement that consist validation guidelines (Hair, 2010; Urbach , 2010). Reliability means repeatability or consistency (Wong, 2013). Internal consistency reliability assessment traditional criterion using Cronbach's Alpha (CA) assumed high alpha value on one construct item will be same range and connotation (Hair et al., 2013). Recommendations are made to use composite reliability (CR), an alternative measurement to Cronbach's Alpha, able to overcome deficiencies of CA of LV's reliability internal consistency by SEM PLS analysis techniques (Wan Asyraf, 2014) by taking considerations of loadings differences indicators (Robert & Kim, 2013). Despite the differences of internal consistency assessment' coefficient used, data reliability is said to have a value above .700 as desirably attractive values and any value less than 0.700 reflect slack in reliability (Robert & Kim, 2013).

Indicator reliability indicate item construct reliability Urbach (2010) monitored by loadings reflective indicators (Recker, 2012; Urbach, 2010) where 50% of each

indicators variance by LV with a significant value of 0.7 loading indicator tested via methods of resampling. When the value of loading is less than 0.7 the adjustment to the model of measurement need to be done by dropping the caused indicators and need to run the PLS algorithm again for the desired output.

Construct validity refer to the intensity of intended variable measurement (Ivano et al., 2015; Urbach, 2010). In constructing validity assurance, there need to correlate similar construct indicator statements with high correlation value indicating validity convergent and difference is correlations of indicator statements constructs indicating low value of correlation as validity discriminant (Ringle et al., 2012). Items having constructs of different measurement referred as validity convergent confirmed by average variance extracted (AVE) (Fornell & David, 1981). An AVE value of at least 0.500 displayed sufficient validity convergent signified that indicators variance one average explained by LV.

Validity discriminant (Urbach; 2010) reflect differences in different constructs' measurements. Measurements of items construct is tested by validity convergent. Validity discriminant enable unintentionally measurement tests (Andreev et al., 2009; Hair et al., 2011). PLS SEM validity discriminant common measurements are:

1. cross-loading: correlation of all items with scores of each component (Josette, 1994; Urbach, 2010).

Indicators of different constructs are non-exchangeable if the designed construct is lower than indicator's loading (Polites et al., 2012).

2. Fornell-Larcker criterion: when there is more variance of indicator assigned to LV (Fornell & David 1981) where LV AVE is highest squared correlation than other LV (Urbach, 2010).

Table 3.3: Models Measurement Assessment Criteria for the of this Research

Validity Type	Criterion	Description	References
Internal consistency reliability	Composite Reliability (CR)	Factor loadings summation measurement relative to loadings factor plus variance error summation where value of 0 indicate completely unreliable to 1 indicate perfectly reliable. Explorative confirmative research value of threshold proposed value of CA to be > .800 or .900 (0.700) and minimum values of 600.	(Urbach, 2010)
Indicator reliability	Indicator loading	LV explained the variance indicators measurement where value of 0.700 and higher implied significant values. Used normally in designs of exploratory research designs.	(Urbach, 2010)
Convergent validity	Average Variance Extracted (AVE)	Measuring LV variance error measurement indicators with proposed value of threshold AVE > 0.500	(Fornell, 1981; Urbach, 2010)
Discriminate validity	Cross-Loading	Correlation of scores' component of latent variable items where higher loading indicators of designated construct compared to other constructs indicate that each construct are implicative to be different.	(Urbach, 2010)
Discriminate validity	Fornell-Larcker criterion	Need of more LV sharing variance indicators assignment where each LV's AVE need to be higher than any other LV highest squared correlation.	(Fornell, 1981; Urbach, 2010)

The Structural Model: Analysis of structural model after the successful validation of reflective measurement models done (Urbach, 2010). Path coefficients significance and relevance assessment. Coefficient of determination (R^2) valuation of endogenous LV's (Hair et al., 2013) sign of algebraic coefficient, eminence and prominence checked by SEM. Path with difference of signed compared to expected relationship in theory indicate no-supporting evidence to hypothesis proposed and eminence of path coefficient's signifies the two LV's relationship strength (Becker et al., 2012; Urbach, 2010).

Prior researches suggested that path coefficients value to be least 0.100 for effect and 0.50 to be significant (Silvia, 2010; Urbach, 2010) using bootstrapping resampling

techniques to determine significance (Zoumpoulaki et al., 2015). Hypothesis are rejected in a two tailed t-test critical t-statistic having five percent (5%) level of significance when t-statics value is less than 1.98.

The coefficient of determination (R2) explained LV's variance and total variance relationships (Maznah et al., 2015) that a minimum substantial value of .670, average value of .333 and weak value as .190 and lower Urbach (2010).

Table 3.4: Structural Models Assessment Criteria for the of this Research

Validity Type	Criterion	Description	References
Model Validity	Coefficient of determination (R2)	LV relative variance measurement explanation having substantial value of 0.670, moderate value of 0.333 and weak values of 0.190 and below	(Urbach, 2010)
Model Validity	Path coefficients	Analysis of LVs Path coefficients t-test (algebraic sign, eminence and prominence)	(Urbach, 2010)

3.4.3 Hypothesis Testing and Model Building

The research hypothesis matches what the research is trying to show is true in the problem. To test the hypotheses, t-test in SmartPLS were used to ensuring validity, reliability and confidence for the results. Best use of hypothesis testing is in researches that exploration of the problem has been done and discussed and that the research objective is to determine availability of latent variables by investigating using t-values to accept or reject the hypothesis based on t-value < 1.96 and p-value < 0.05 (Uma Sekran 2000).

This research used bootstrapping t-values calculation testing of path coefficients. The non-parametric bootstrapping procedure was applied with 503 cases, 5,000 sub-samples and individual sign changes (Hair et al., 2012). The research model has 26 research

hypothesis as explained in Chapter 1 section 1.7. These hypotheses were initiated in order to show the effect of the factors and the constructs toward the student's ICT skill. Among these 26 hypothesis, only five were accepted while the others were rejected due to the insignificant of the t-values and p-values.

3.5 Summary of the Chapter

In this chapter we have discussed the methodology for this research. In details, the discussions included discussions on research design such as research model, population of the study, questionnaire design, pilot of the study, validity and reliability of the question and the survey. In addition, the model building has been discussed, such as data preparation, data analysis and the hypothesis testing. In the next chapter we are going to discuss the data collection.

CHAPTER 4: DATA COLLECTION

4.1 Introduction

This chapter explained in detail the data collection process for this research. This process involved the process of obtaining data from the relevant research respondents by firstly identifying the respondents targeted. After the data has been collected, the data are then categories by themes. Many research methodology and strategy has been designed and used to collect data. This research employed online survey to collect data by strategizing on online efficiency and manageability in terms of time, effort and cost spent.

Data collection instrument for the primary method of collecting data for this study was Google docs an online survey questionnaires chosen best for it efficiency and capabilities in engaging various respondents from different parts of Malaysia.

Data collection begun with outlining strategizing planning and preparing data collection procedures. Activities involved (Oates, 2005):

1- Identify data type needed by understanding the research objectives and purpose.
2- Do an analysis of research methodology and identify relevant method to be used as the method to collect data.
3- Knowledge of the target respondent selection and profile.
4- Comply with ethics guidelines in research.
5- Conduct questionnaire validity and reliability using pilot study.
6- Use relevant and appropriate analysis tools to process the data that have been collected.

The data collection was based on the phases as described in Chapter 3. The phases are:

Phase 1- identification of the problem and analyzation of the gap, based on the literature review; Phase 2 – involved the research instruments which include the design and implementation of the survey. This phase covered the research design, questionnaires design, pilot study, validity and reliability of the questionnaires and the research survey, and finally Phase 3 - analysis and result. This phase covered data preparation, data analysis, hypothesis testing and model building.

Specifically, data was collected in Phase 2 where the survey questions were used as the instrument to capture respondents' responses. The questionnaire is divided into three section: demography, ICT affecting factors questionnaires and user acceptance.

4.2 Sample of the Study

The total number of participant acting as research respondents in this research was 504 students. They were randomly selected from eighteen universities in Malaysia, refer to table 4.1. A link to the survey was posted by email to the student's universities mailing. The survey was opened on 26 of May 2015 and closed 1 of June 2015, and a total of five hundred and four responses were captured. All the responses were completed (100%). The participants were motivated by Five Ringgit Malaysian mobile credit (top-up) as a gift. They were very excited and thankful. Females makes the majority as student's respondent (291; 57.7%), while males respondents were less (213; 42,3%).

However, the age of the student's being the respondents of this research were mainly between eighteen (18) and twenty-four (24) (88.3%), followed by the category twenty-five (25) to thirty-four (34) (10.3%), thirty-five (35) to forty (40) (1.2%) and bigger than forty (0.2%).

Furthermore, the student's study level with the third year students as the majority participants (203; 40.3%), followed by second year (119; 23.6%), fourth year (90; 17.9%), first year students (79; 15.7%), fifth year students (5; 1%), sixth year students (4;0.8%) and seventh year students (4; 0.8%).

indicated the type of higher learning institutes (HEIs) that the respondents belong to where the majority of the students are from public universities (469; 93.1%), followed by private university and university college (25; 5%), private college (7; 1.4%) and foreign university branch campus (3; 0.6%).

The students sample stratification of respondents based on type of higher learning institutes (HEIs) that the respondents belongs to where the majority of the students are from public universities (469; 93.1%), followed by private university and university college (25; 5%), private college (7; 1.4%) and foreign university branch campus (3; 0.6%). Furthermore, on their academic discipline represented in terms of their faculties and programs studied, where students from the Faculty of Computer and Technology as the most participants (92; 18.3%) followed by Faculty of Engineering and Technical Skills (90; 17.9%), Faculty of Business Administration and Management (73; 14.5%), Science and Mathematics (66; 13.1%), Faculty of Social Science (44; 8.7%), Faculty of Medicine (27; 5.4%), Faculty of Agriculture (21; 4.2%), Faculty of Language Studies (19; 3.8%), Faculty of Health and Welfare (18; 3.6%), Faculty of Education (17; 3.4%), Faculty of Art Design and Music (10; 2%), Faculty of Law (7; 1.4%), Faculty of Social Science (Communication) (6; 1.2%) , Faculty of Humanities (5; 1%), Faculty of Manufacturing and Construction (Construction) (3; 0.6%), Faculty of Hospitality and Tourism (3; 0.6%), Faculty of Aviation and Maritime (2; 0.4%) and Faculty of Manufacturing and Construction (Manufacturing) (1; 0.2%).

In addition, it was found that most of the students were full time students (475; 94.2%), followed by part time students (20; 4%) and distance learning students (9; 1.8%).

The students' years of experience in ICT, students who had used the computer for more than eight years was represented by the majority (247; 49%), followed by the students who had used the computer for between 4 and 8 years were (180; 35.7%), next the students who had used the computer between 1 and 3 years were (67; 13.3%) and finally only a few students (10; 2%) who had used the computer less than 1 year. This research is looking at vast differences in terms of the levels of experience using computers among the research participants. Refer to (Table 4.1).

Table 4.1: Public and Private Universities in Malaysia

Private universities	Participants	Public universities	Participants
University Tunku Abdul Rahman	5	University Malaya	100
International Medical University	0	University Teknologi Malaysia	40
University Kuala Lumpur	1	University Tun Hussein Onn Malaysia	0
Wawasan Open University (WOU)	1	University Utara Malaysia	5
University Tun Abdul Razak	4	University Malaysia Kelantan	0
Malaysia University of Science and Technology	6	University Pertahanan Nasional Malaysia	3
University Tenaga Nasional	5	University Teknikal Malaysia Melaka	7
Asia e University (AeU)	0	University Sains Islam Malaysia	20
Asia Metropolitan University (AMU)	0	University Malaysia Pahang	75
UCSI University	4	University Sains Malaysia	70
University Selangor (UNISEL)	3	University Pendidikan Sultan Idris	
AI-Madinah International University (MEDIU)	0	University Malaysia Perlis	9
SUNWAY UNIVERSITY	4	University Malaysia Sabah	8
GlobalNxt University	0	University Malaysia Sarawak	10
Manipal International University(MIU)	0	University Islam Antarabangsa Malaysia	25

UNITAR International University	0	University Kebangsaan Malaysia	25
Open University Malaysia	0	University Teknologi MARA	28
Quest International University Perak	0	University Putra Malaysia	44
LIMKOKWING University of Creative Technology (LUCT)	2		
Raffles University Iskandar (RUI)	0		
Management and Science University	0		
Multimedia University	1		
University Technology Petronas (UTP)	0		
AIMST University	0		
Albukhary International University	0		
International Centre for Education in Islamic Finance (INCEIF)	0		

Table 4.2: Profile of response

Demographic Items	Description	Frequency	Percent
Gender	Male	213	42%
	Female	291	58%
Age	18-24 Years old	445	88.3%
	25-34 Years old	52	10.3%
	35-40 Years old	6	1.2%
	>40 Years old	1	0.2%
Study Level	1st Year	79	15.7%
	2nd Year	119	23.6%
	3rd Year	203	40.3%
	4th Year	90	17.9%
	5th Year	5	1%
	6th Year	4	0.8%
	7th Year	4	0.8%
Academic discipline	Computer and Technology	92	18.3%
	Engineering and Technical Skills	90	17.9%
	Business Administration	73	14.5%
	Science and Mathematics	66	13.1%
	Faculty of Social Science	44	8.7%
	Faculty of Medicine	27	5.4%
	Faculty of Agriculture	21	4.2%
	Faculty of Language Studies	19	3.8%
	Faculty of Health and Welfare	18	3.6%
	Faculty of Education	17	3.4%
	Faculty of Art Design and Music	10	2%
	Faculty of Law	7	1.4%
	Social Science (Communication)	6	1.2%
	Faculty of Humanities	5	1%

	Manufacturing and Construction	3	0.6%
	Faculty of Hospitality and Tourism	3	0.6%
	Faculty of Aviation and Maritime	2	0.4%
	Manufacturing and Construction (Manufacturing)	1	0.2%
	Foreign university branch campus	3	0.6%
Study Mode	Full Time	475	94.2%
	Part Time	20	4%
	Distance Learning	9	1.8%
Years of experiences	More than 8 years	247	49%
	4-8 years	180	35.7%
	1-3 years	67	13.3%
	Less than 1 year	10	2%

4.3 Responses from the Research Survey

Likert items composed of many items that can be of nominal, ordinal or interval and Brown (2011) suggested that that interval scale statistics present the items of individual Likert as means and standard deviations, a nominal and ordinal scale statistic present it as a percent or the frequency of people who selected each option and allow the reader to interpret the results at the Likert -item level and allow the reader to interpret the results at the Likert -item level in the research analysis process.

In this research, the sections below displayed the measurement of the various latent variables in the two individual populations' PLS-SEM statements of individual indicator statistics using ordinal (in bar charts and modes in tables) as well as interval scale (means and standard deviations in tables) as research Hair al. (2013) has found that it is not relevant for arithmetic means or variance of ordinal data calculation as assumptions cannot be made on equally space of differences. A well-structured Likert scale with appropriate categories (1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree), the inference is that the distance between categories 1 and 2 is the same as between 3 and 4 (Hair et al., 2013).

4.3.1 Psychology Factors

4.3.1.1 Attitude

Figures 4:1 to 4:4 graphically summarized the student's responses to the attitude indicators statements explaining attitude relate to intention to use computers. Most students agreed that learning ICT is important for them in future employment as the mode indicator mostly were four (4). Attention is denoted as Att.

Attitude (Att1) indicator statement is "Learning and using ICT is good idea"

For this indicator most of the students agreed and strongly agreed that learning computer is a good idea while less number of students disagreed or rated as natural (refer to Figure 4.1). It could be the reason that most of the students believed that good idea to use telecommunication to store, transmit, process or access digital information.

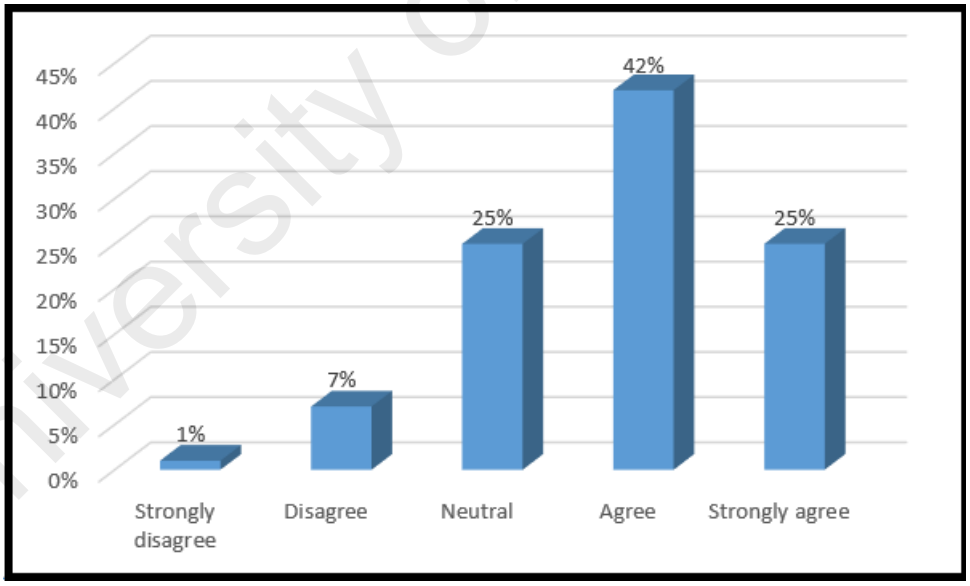

Figure 4.1: Students' Attitude towards Learning ICT

Att2 indicator statement is "Learn and use ICT make me more interesting".

High number of students agreed that learn ICT is interesting able to secure remunerative salary profession where multiple skill sets provide advantages to explore different than the so called traditional IT career s (refer to Figure 4.2).

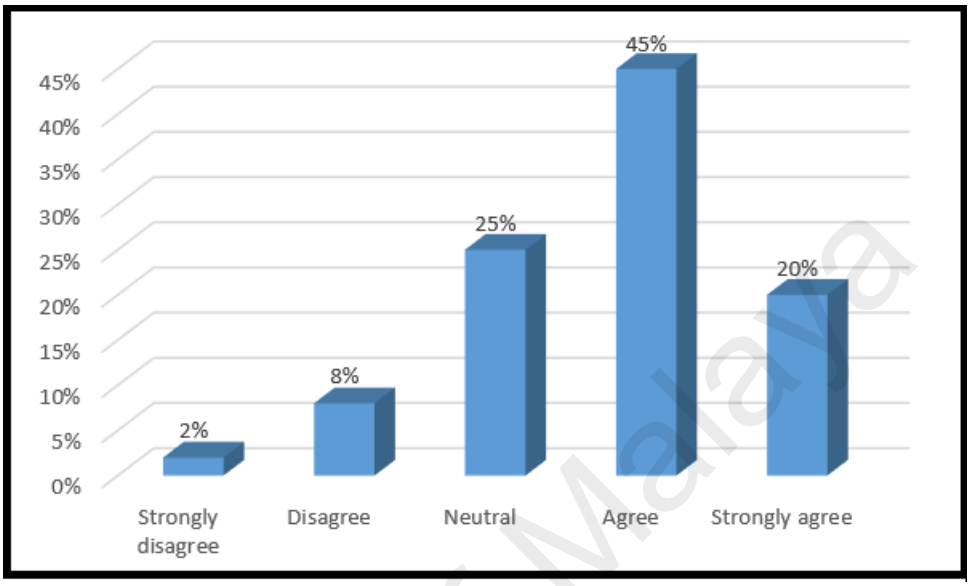

Figure 4.2: Students and ICT as Interesting

Att3 indicator statement is “Working on computer is fun”.

As for indicator Att3, most of the students agreed and strongly agreed that working on computer is fun (refer to Figure 4.3). However, there are also some students who disagreed with that statement. The students believed that computer is fun for checking out new games, chatting with friends, learning something new, exploring computers as a hobby, watching funny videos or even creating your own content to share. It was found that as long as the computer works, they will never have to be bored again.

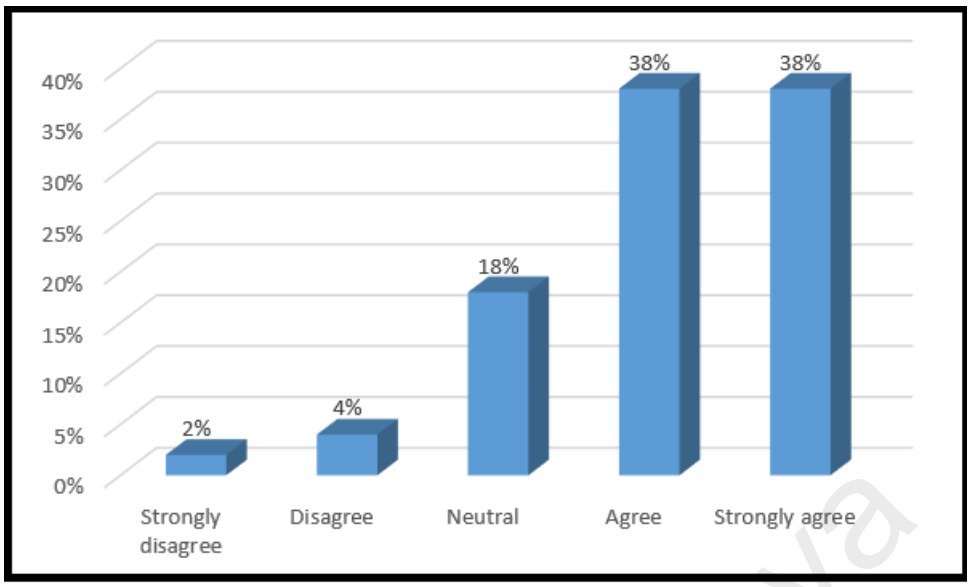

Figure 4.3: Students' Attitude toward Work on Computer

Att4 indicator statement is "I like to work on computer and learn ICT skills".

Approximate 45% of the students agreed that they prefer to work with computer, 28% of the students strongly agreed while the remaining percentage of students where natural or disagreed on that statement (refer to Figure 4.4).

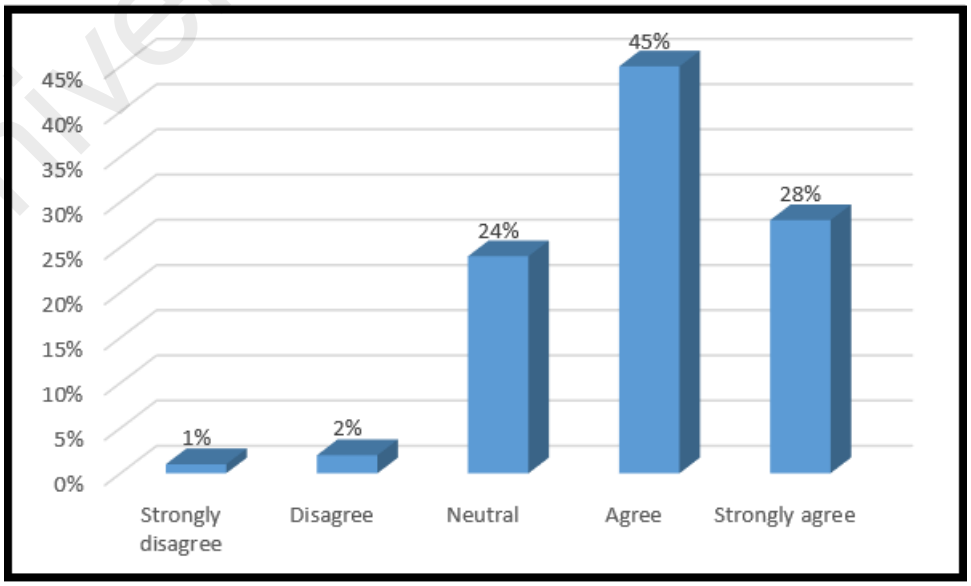

Figure 4.4: Working on Computer and Learning ICT Skills

4.3.1.2 Anxiety

Figures 4:5 to 4:8 graphically summarized the student's responses to the anxiety indicators statements. Computer anxiety is defined as computer phobic in addition to worry and tension of stress and uneasiness of computers use. Anxiety is denoted as Anx. The mode for indicator for Anx1 and Anx2 are four (4), while the remaining indicators Anx3 and Anx4 are mode one (1) and mode two (2) which indicates that only half of the students agreed that anxiety is one of the factors that affect ICT skills while some of the other students do not agreed that anxiety affect ICT skills.

Anx1 indicator statement is "I feel apprehensive about using computer".

Figure 4.5 shows that the percentage of students feeling worried when they are using computers is slightly higher that the students who are not apprehensive about using computer.

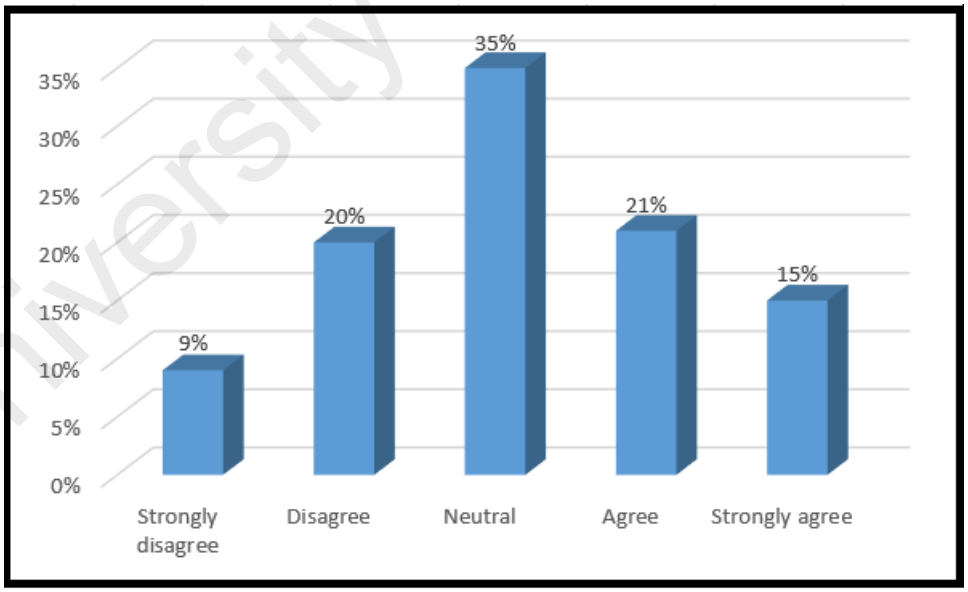

Figure 4.5: Apprehensive When Using Computer

Anx2 indicator statement is “I hesitate to use the computer for fear of making mistakes”.

Figure 4.6 shows that many students hesitated to use computer. It could be to avoid doing any mistake.

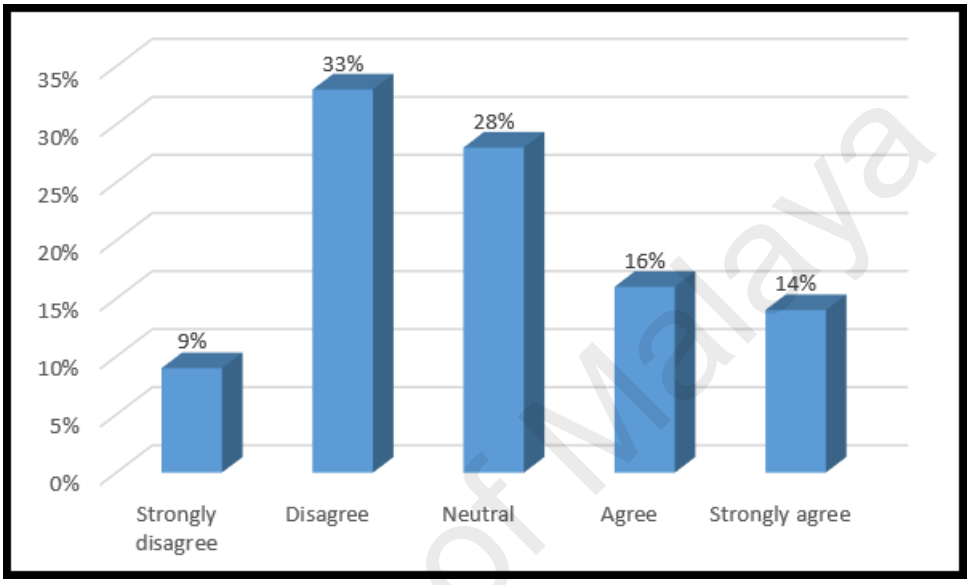

Figure 4.6: Hesitation to use Computer

Anx3 indicator statement is “ICT is somewhat intimidating to me”.

Figure 4.7 highlighted the percentage of students felt ICT is somewhat intimidating them.

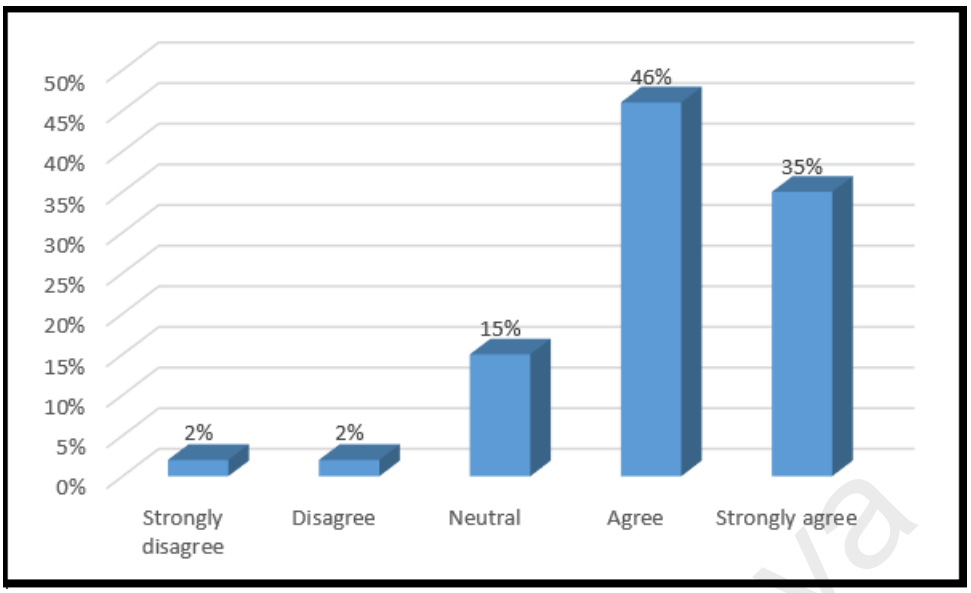

Figure 4.7: ICT as Intimidating

Anx4 indicator statement is "I feel not confident to use ICT to perform my work". Figure 4.8 illustrated that many students were not confident to use computer to perform their work.

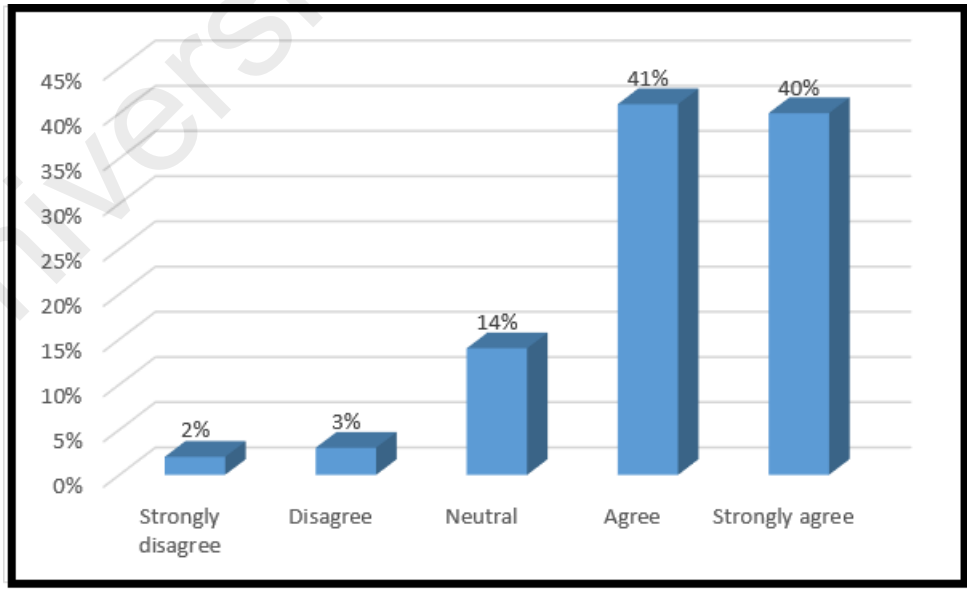

Figure 4.8: Confidence Using ICT

4.3.1.3 Self-efficacy

Figures 4:15 to 4:18 graphically summarized the student's responses to the self-efficacy indicators statements which reflects on the expected level of capability, a sign that students believed that he/she is capable of accomplishing computing-related tasks almost without the need for supervision or assistance. Self-efficacy is the degree of generalizability is directly proportional to the expected level of ability in doing various systems computer tasks. The research showed that most students agreed that self-efficacy is one of the factors that affect ICT skills as shown by the indicators mode as four (4). Self-efficacy is denoted as SelEfl.

SelEf1 indicator statement is "I could learn ICT very well if I had a lot of time and resources".

Figure 4.9 showed high percentage of students responded that they are self-confident if they have the available resources and time they could perform very well in ICT.

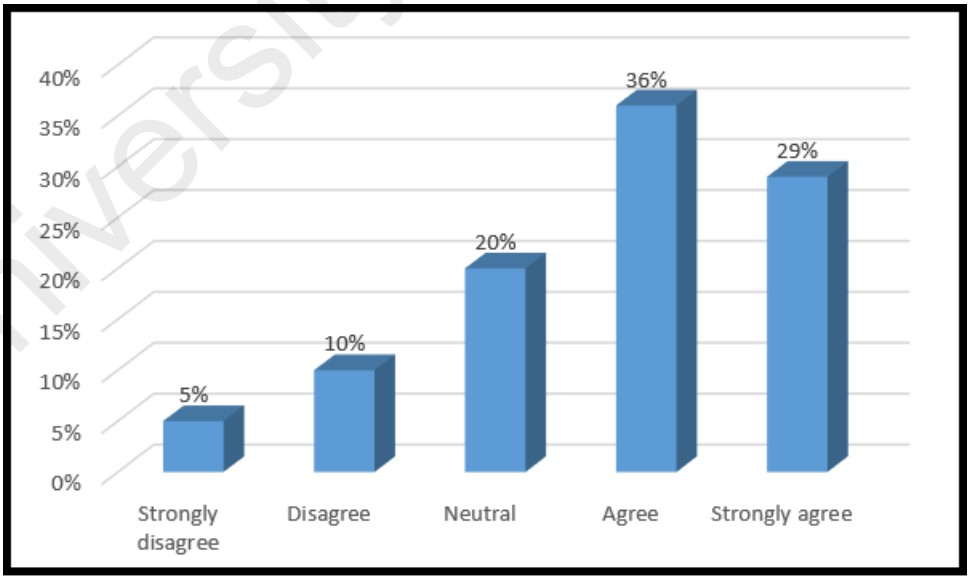

Figure 4.9: Self-efficacy and Time/Resources Allocation

SelEf2 indicator statement is “I could complete any task related to my work using computer if I got assistance”.

Figure 4.10 showed that most of the students were sure that they can complete all the ICT tasks if they had some assistance.

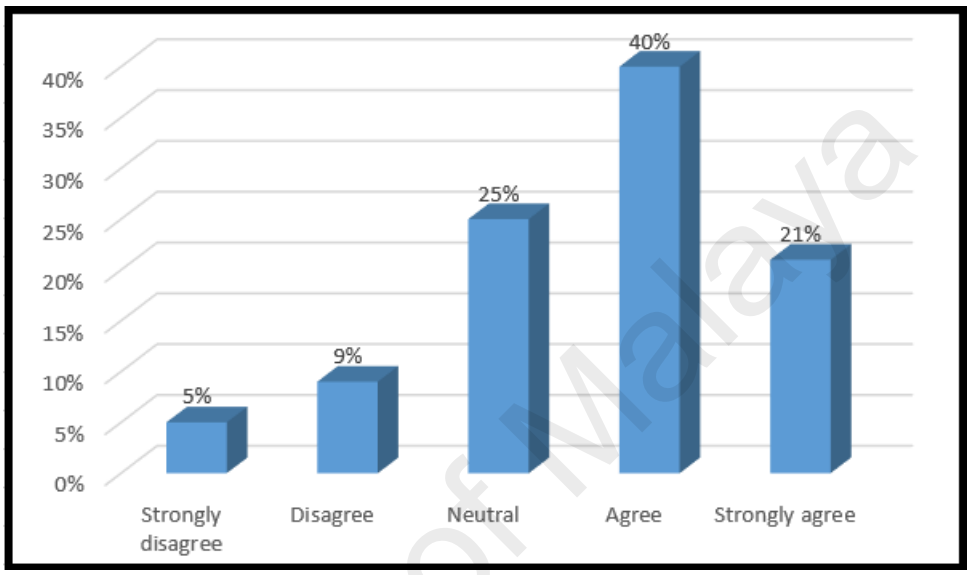

Figure 4.10: Self-efficacy and Tasks Completion Using Computer

SelEf3 indicator statement is “I could complete a job or task using computer if there was no one around to tell me what to do as I go”.

Figure 4.11 presented most students (75%) agreed that they were able to do their ICT work independently if no one interrupts them

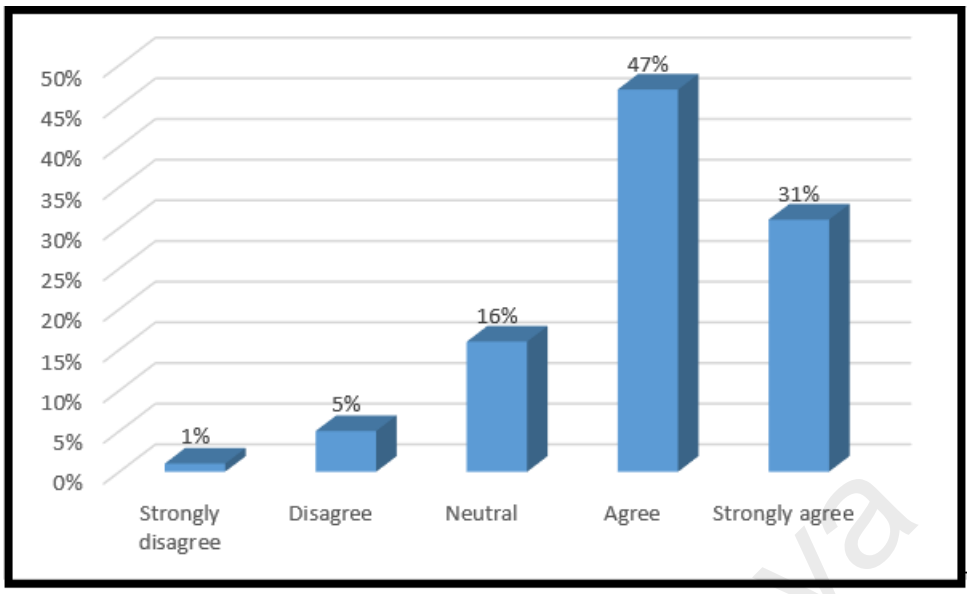

Figure 4.11: Self-efficacy to Complete Task Independently

SelEf4 indicator statement is "if I get one time training I will be very well in ICT skills".

Figure 4.12 showed high percentage of students agreed that they will be more skillful if they get the ICT training.

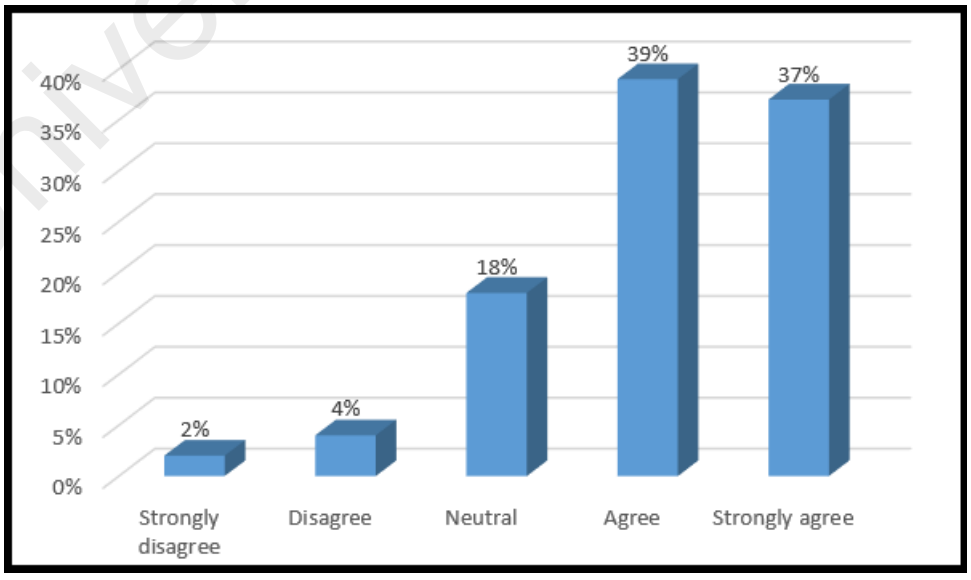

Figure 4.12: Self-efficacy and Training

4.3.2 Availability of Time

Figures 4:13 to 4:16 graphically summarized the students' responses to the time indicators statements. This means that the students believed the importance of free time able to contribute towards learning computer skills. Most students agreed that time one of the critical factors that affect ICT skills as mode of indicators is four (4), which indicates that Available Time is denoted as AvTim.

AvTim1 indicator statement is "I don't have time to learn and use ICT".

Figure 4.13 showed the importance of time availability in ICT learning according to the students' opinions.

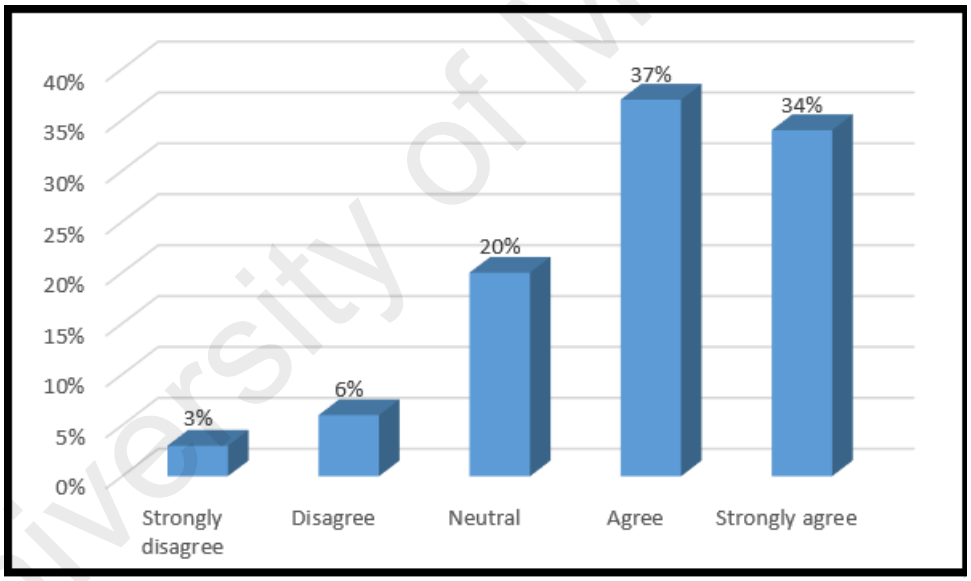

Figure 4.13: Lack of Time to Learn ICT

AvTim2 indicator statement is "Spending much time working with computers will help to increase student's ICT skills".

Figure 4.14 showed that a higher percentage of students agreed that spending more time with computer will help to increase the ICT skills.

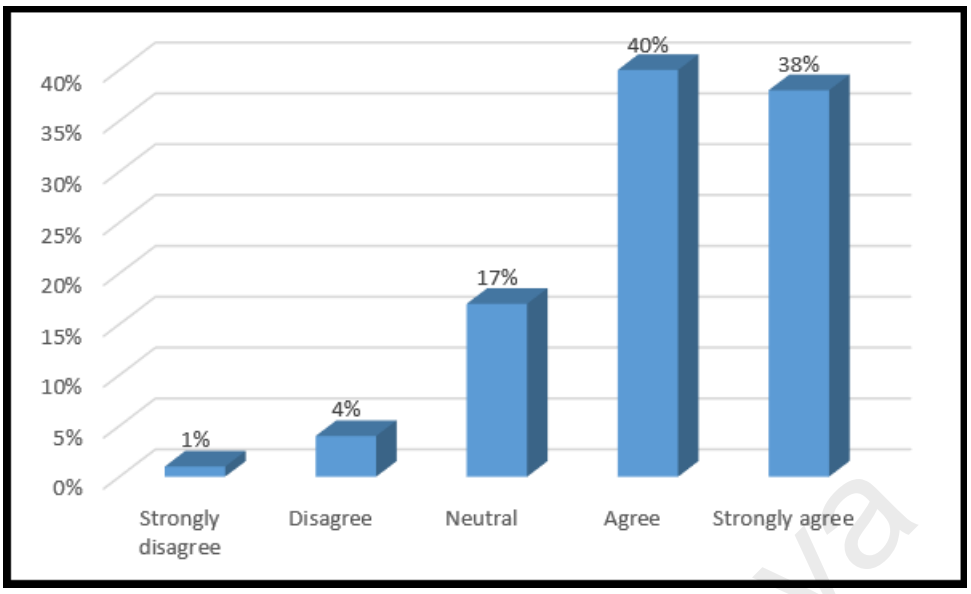

Figure 4.14: Spending More Time Using Computer

AvTim3 indicator statement is "Availability of time at schools got high impact on the student's ICT skills".

Figure 4.15 indicated that the students' responses and agreed on the importance of availability of time during their school have high impact on their ICT skills. Availability of time is found as contributing factor towards them to learn ICT skills.

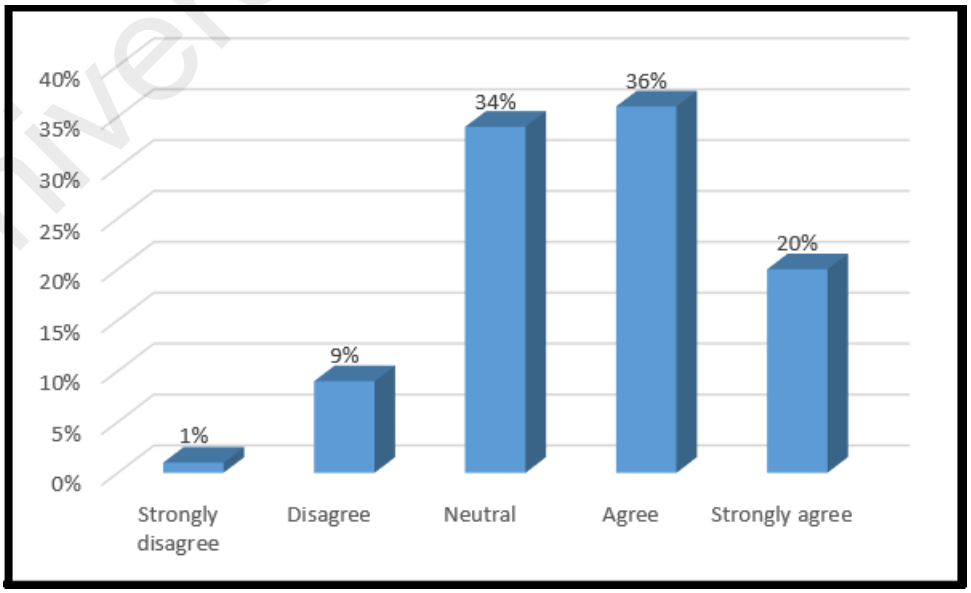

Figure 4.15: Availability of Time at School and ICT Skills

AvTim4 indicator statement is “lack of time hinders students to improve their ICT skills”.

Figure 4.16 showed that most of the students agreed that lack of time hinders them to improve their ICT skills.

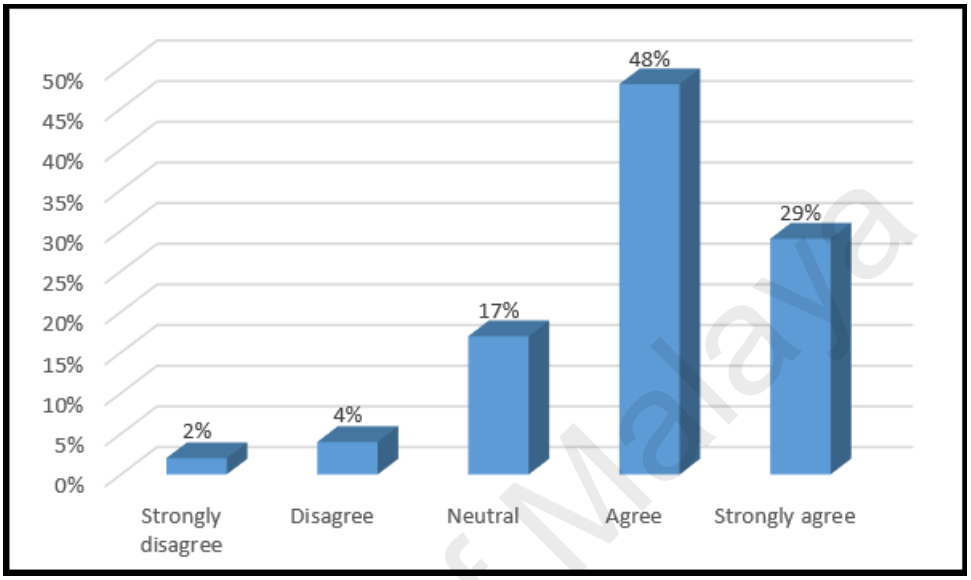

Figure 4.16: Lack of Time to Improve ICT Skills

4.3.3 UTAUT Constructs

4.3.3.1 Performance expectancy

Figures 4:17 to 4:20 graphically summarized the students’ responses towards statements of performance expectancy indicator. Most students agreed that the use of ICT skills are useful in obtaining performance gains in achieving job task in future employment as shown by mode indicator of five (5). Performance expectancy is denoted as PE.

PE1 indicator statement is “ICT skills useful to my future employment”

Figure 4.17 showed that 70% of the students agreed and 20% of students strongly agreed that ICT is very useful for the future employment. Approximate 10% of the students disagreed that ICT skills is useful to their future employment.

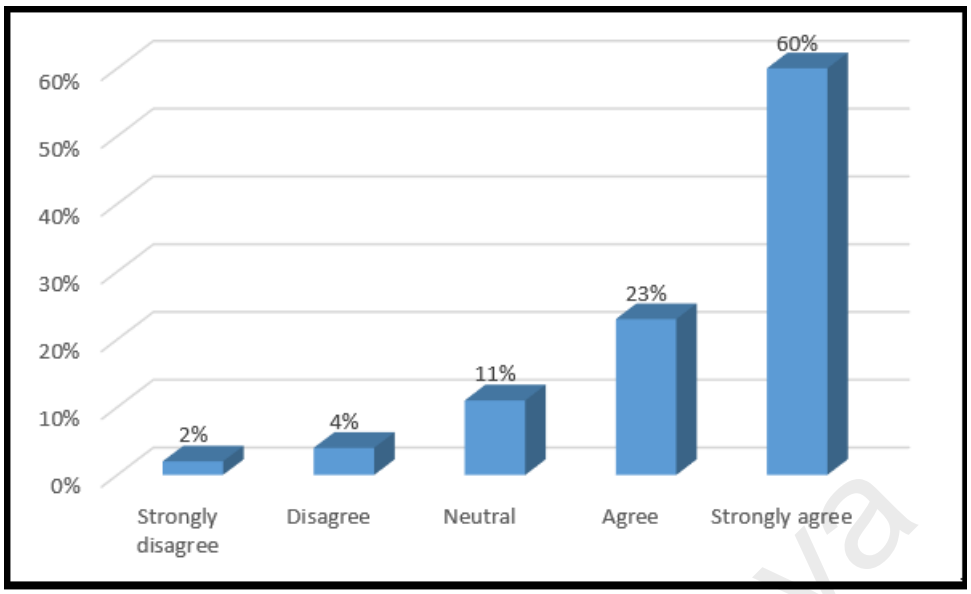

Figure 4.17: ICT Skills Useful for Future Employment

PE2 indicator statement is "Computer allow me to accomplish my work very quickly".

Figure 4.18 indicated that 25% of students agreed and 61% of them strongly agreed that computer allow them to accomplish their work very quickly.

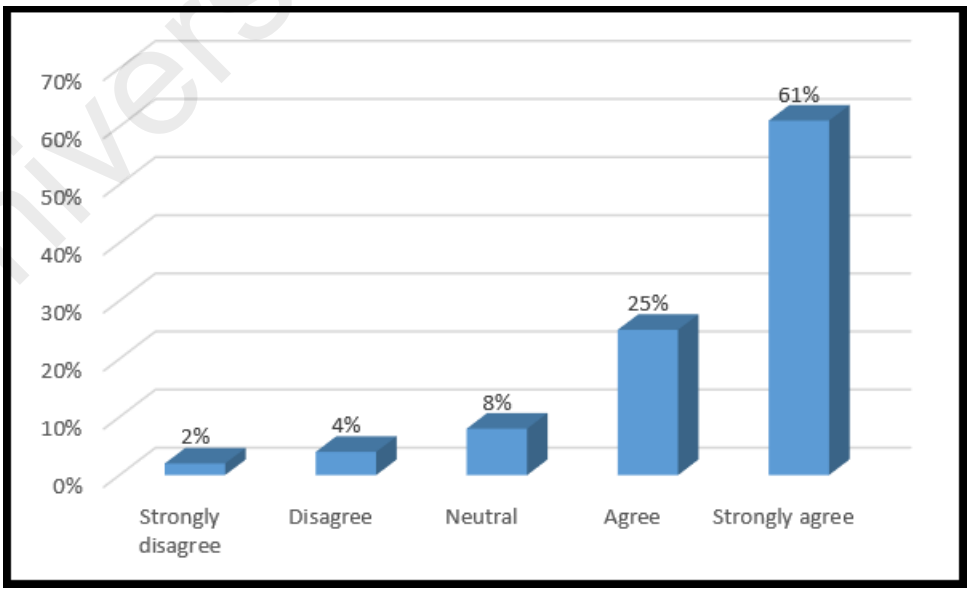

Figure 4.18: Computer Enables to Accomplish Work Quicker

PE3 indicator statement is “Learning ICT useful for my daily life”.

Figure 4.19 showed high percentage of students agreed about the learning ICT is useful for their daily life.

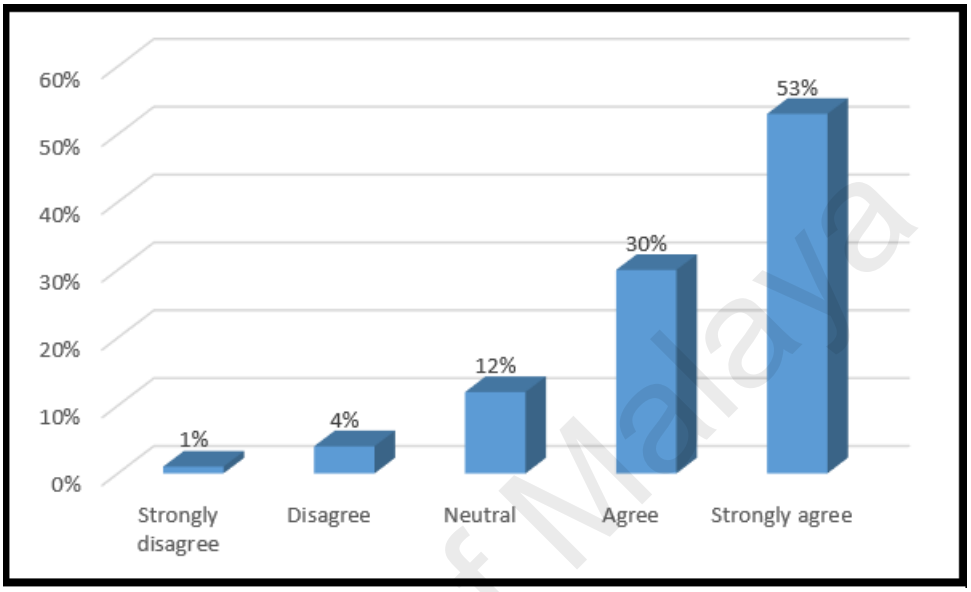

Figure 4.19: Learning ICT Useful for Daily Life

PE4 question is “Using ICT make my learning activities easier”.

Figure 4.20 illustrated that approximately 90% of students agreed and strongly agreed that using ICT makes their learning activities easier.

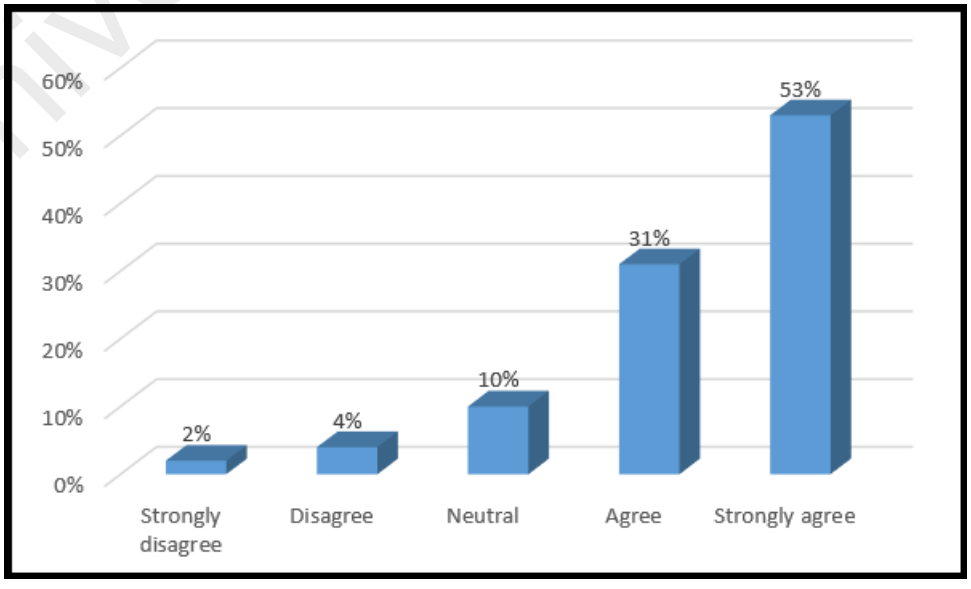

Figure 4.20: Using ICT Makes Learning Activities Easier

4.3.3.2 Effort Expectancy

Figures 4.21 to 4.24 illustrated indicator statements of effort expectancy based on the students' responses. Most students agreed that it does not take much effort to do any ICT related work as shown by mode indicator of four (4). Effort Expectancy Indicator is denoted as EEI.

EE1 indicator statement is "It would be easy for me to become skillful at using the computer".

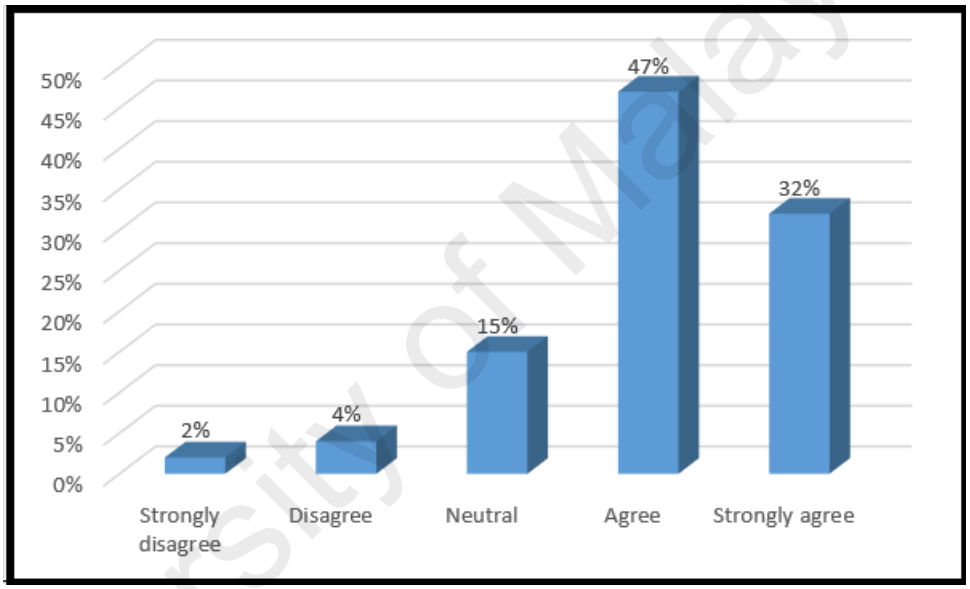

Figure 4.21: Easy to Become Skillful at Using the Computer

EE2 indicator statement is "I would find ICT easy to use".

Figure 4.22 indicated that students felt that it would be easy for them to become skillful in ICT; however, they were slightly less optimistic about whether they would find ICT easy-to-use in the first place.

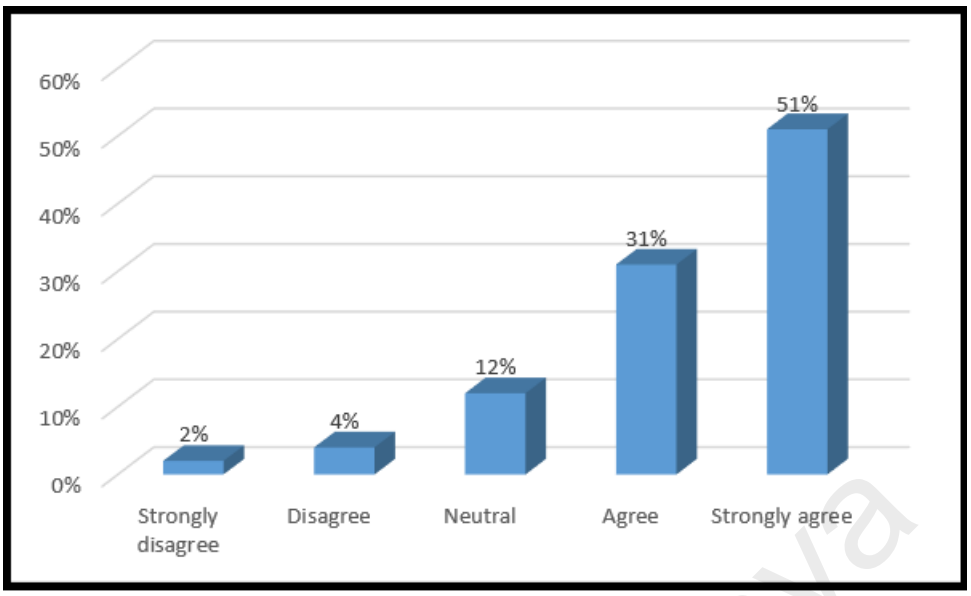

Figure 4.22: ICT Easy to Use

EE3 indicator statement is “Learning computer is easy for me”.

Figure 4.23 showed that most of the students agreed and strongly agreed that learning computer skills is easy followed by neutral responses. However, there were few students who gave negatively answer toward learning computer. In general, the result indicated that the students are confident to learn computer skills.

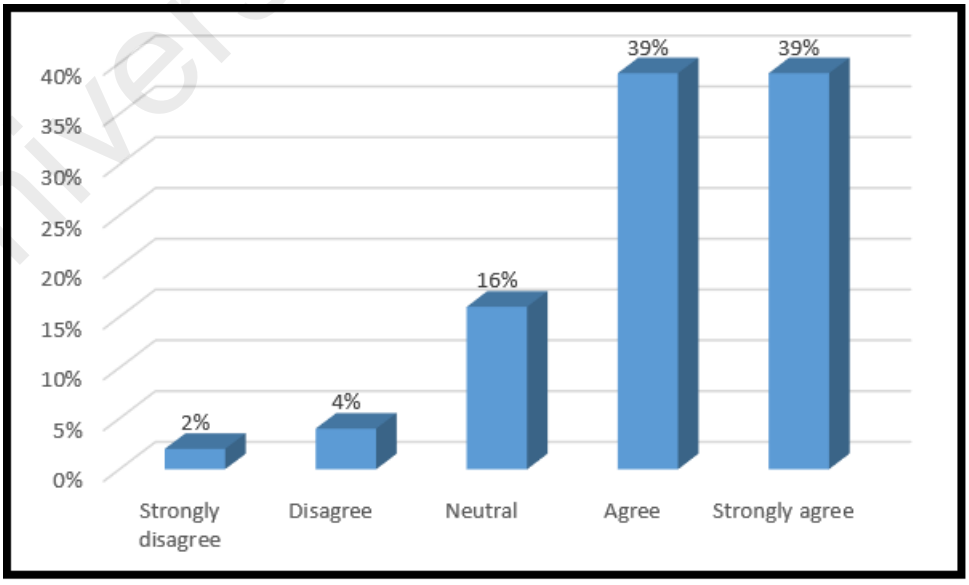

Figure 4.23: Learning Computer is Easy

EE4 indicator statement is “My interaction with the ICT is clear and understandable”. The result in Figure 4.24 illustrated that most of the students strongly agreed and agreed about their interaction with ICT is clear and understandable; indicating that the students gave positive opinions towards ICT skills.

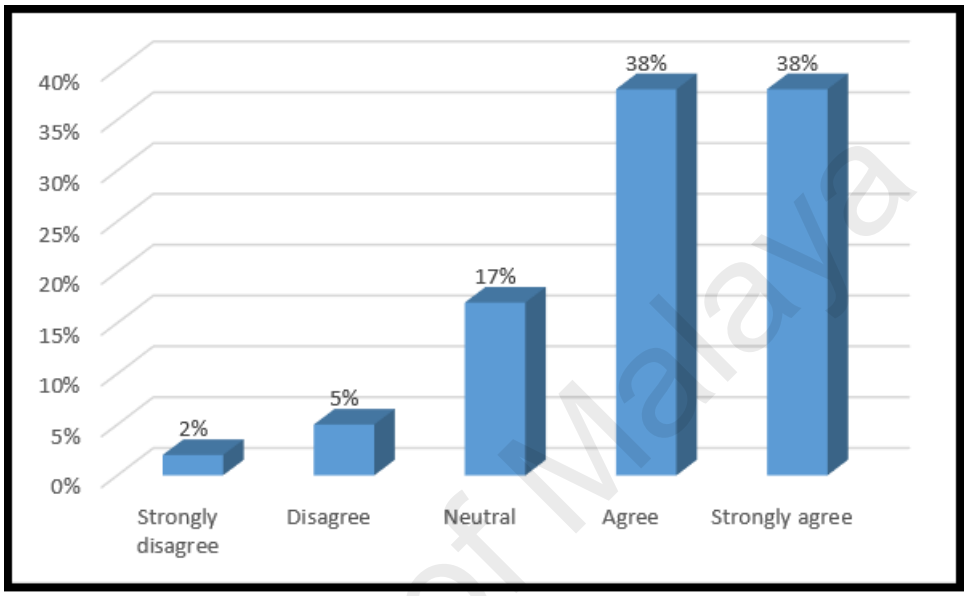

Figure 4.24: Interaction with ICT

4.3.3.3 Social Influence

Figure 4.25 to 4.28 below graphically represented indicator statements of the students’ responses towards social influence. Majority mode indicators was four (4) referring the agreement of most of students the impact of social influence has on their behavior and intention to use ICT. Social Influence is denoted as SI.

SI1 indicator statement is “People who influence my behavior thinks that I should learn ICT skills”.

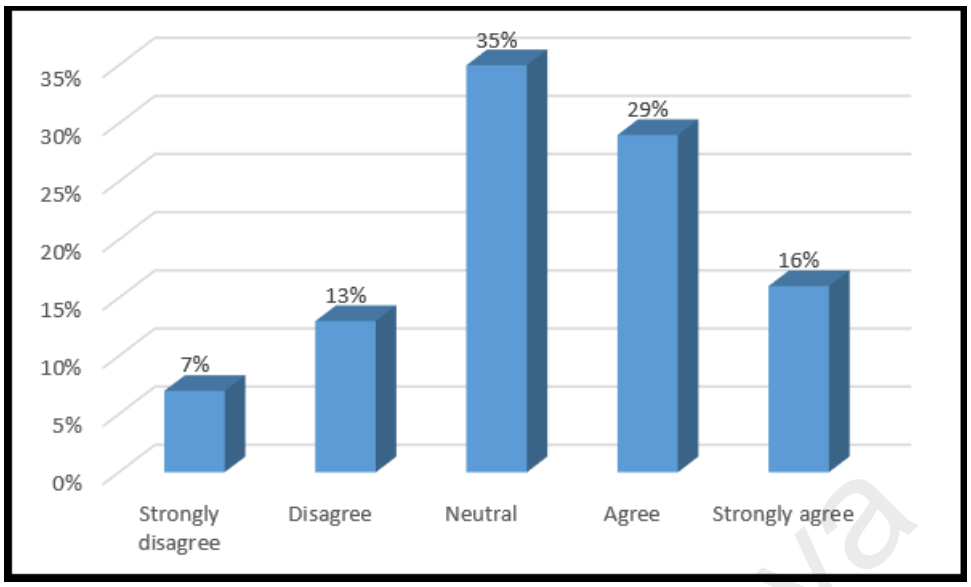

Figure 4.25: People influence on behavior to Learn ICT Skills

SI2 indicator statement is "Lecturer in my institution have been helpful in the use of ICT ". Figure 4.26 showed that most of the students agreed and strongly agreed that lecturer have been helpful with them in using of ICT.

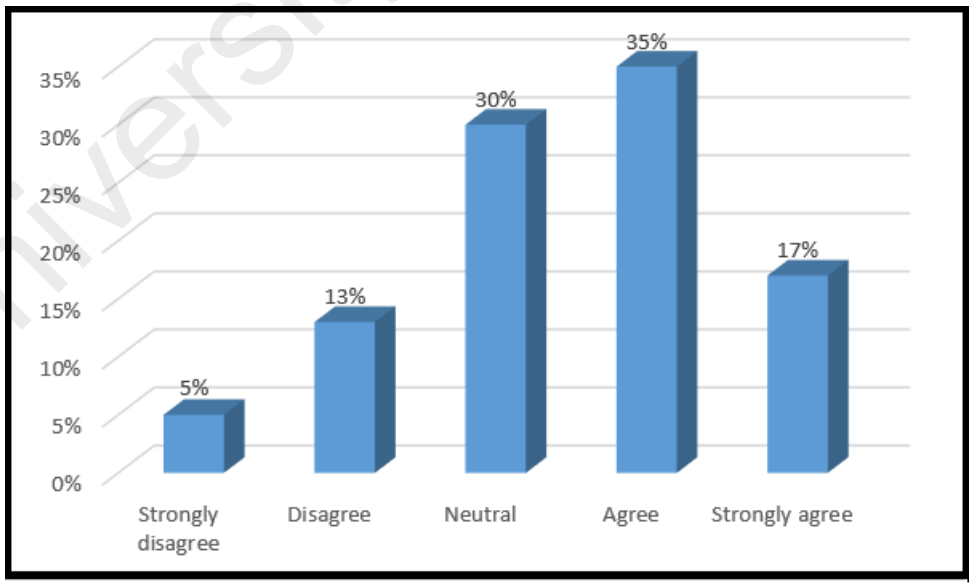

Figure 4.26: Lecturer Helpful in Using ICT

SI3 indicator statement is “People who are important to me think I should learn ICT”.

Figure 4.27 showed that majority of the students strongly agree that their relative and friends supported them to learn ICT skills. Meanwhile the natural percentage were moderate.

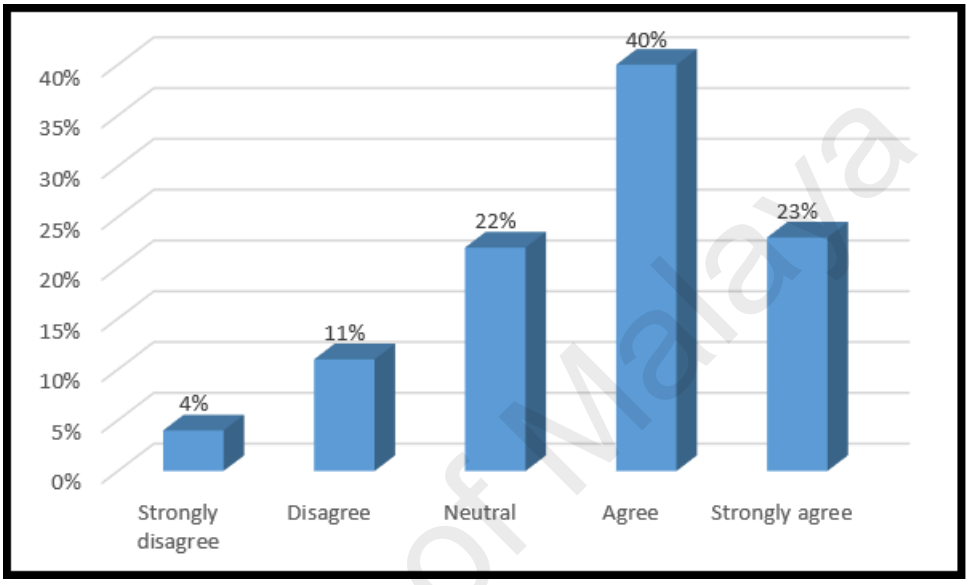

Figure 4.27: Important People Think the Students Should Learn ICT

SI4 indicator statement is “University has supported me to learn ICT”.

Figure 4.28 illustrated that the students strongly agreed that the university has supported them to learn ICT.

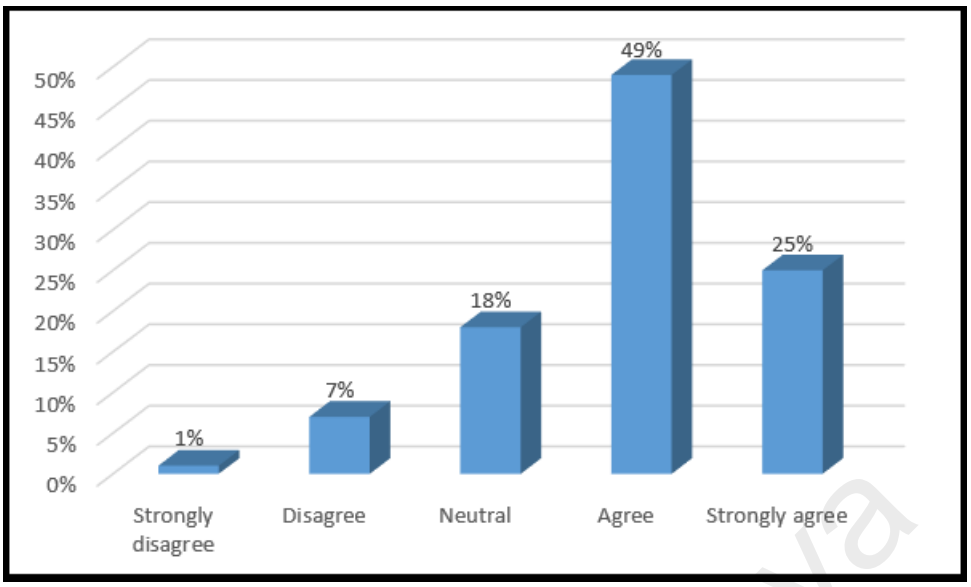

Figure 4.28: Universities Support

4.3.3.4 Facilitating Condition

Figures 4.29 until 4.32 below show the indicator statements responses of students to the facilitating condition influence where the indicators mode was four (4), suggesting agreement of the students that the environment conditions and the ICT resources do facilitate and support their ICT skills. Facilitating Condition is denoted as FC.

FC1 indicator statement is "I have the resources necessary to use ICT". Figure 4.29 showed that there is a high percentage of students agreed and strongly agreed that they have the necessary resources to learn ICT skills.

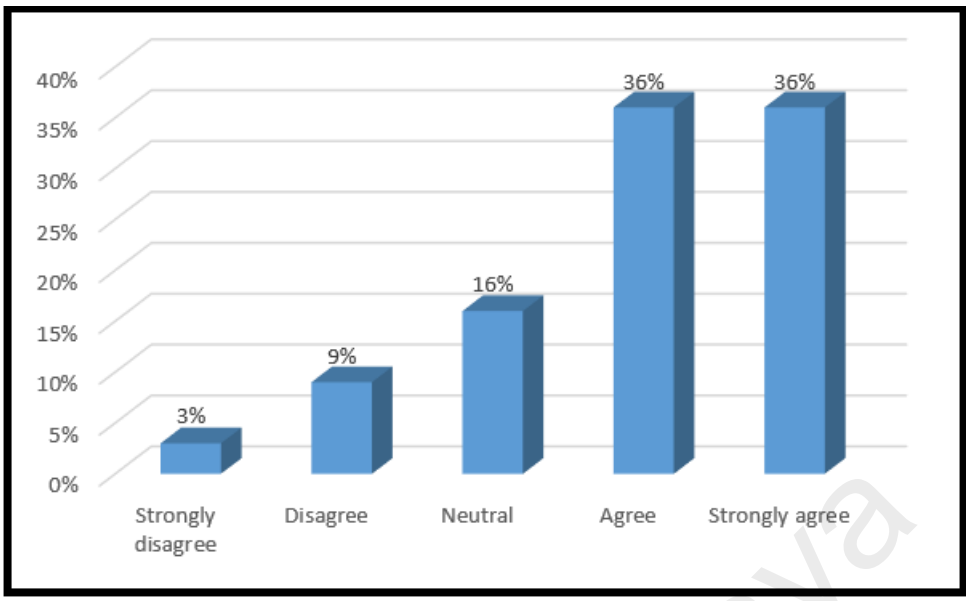

Figure 4.29: Resources Necessary to Use ICT

FC2 indicator statement is “I have the knowledge necessary to use ICT”. Figure 4.30 presents that students mostly believed that they have the knowledge to learn ICT skills.

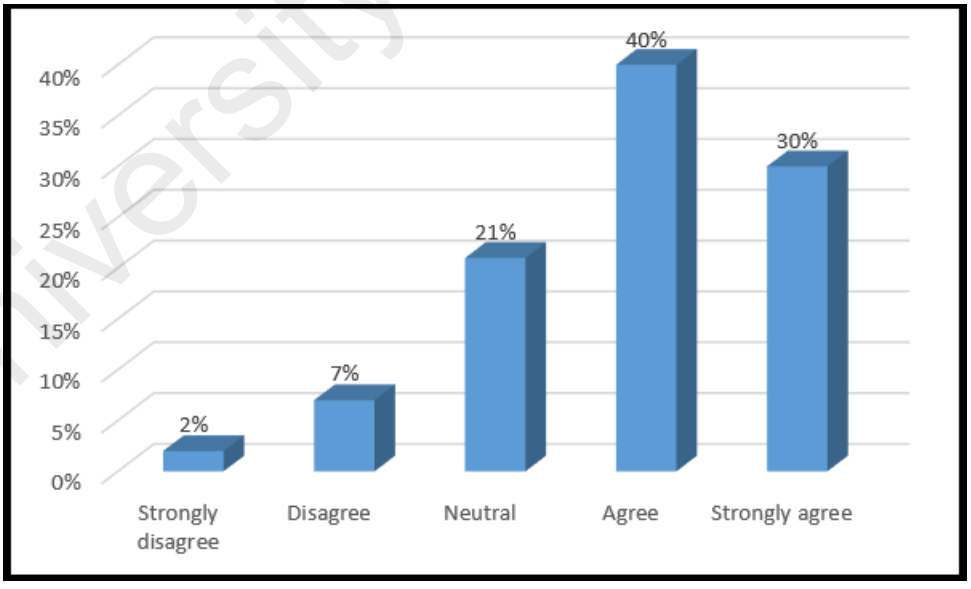

Figure 4.30: Knowledge Necessary to Use ICT'

FC3 indicator statement is “A specific person (or group) is available for assistance with ICT difficulties”.

Figure 4.31 showing that high percentage of students agreed that they have people can assist them to learn ICT skills.

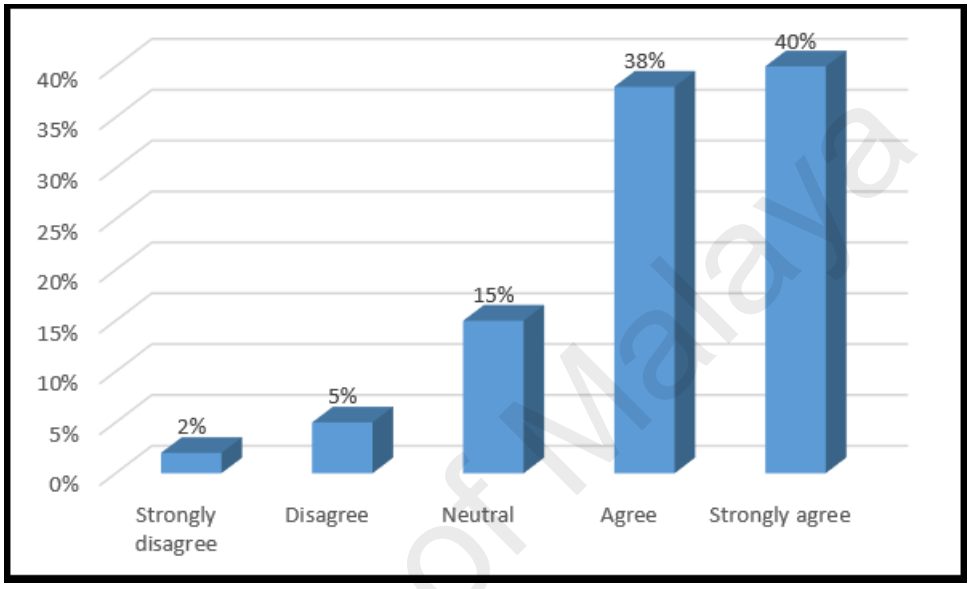

Figure 4.31: Assistance Availability with ICT Difficulties

FC4 indicator statement is “Parents do a good job at home helping me to use ICT”.

Figure 4.32 showing that most of the students agreed that their parents always assist and encourage them to learn ICT skills.

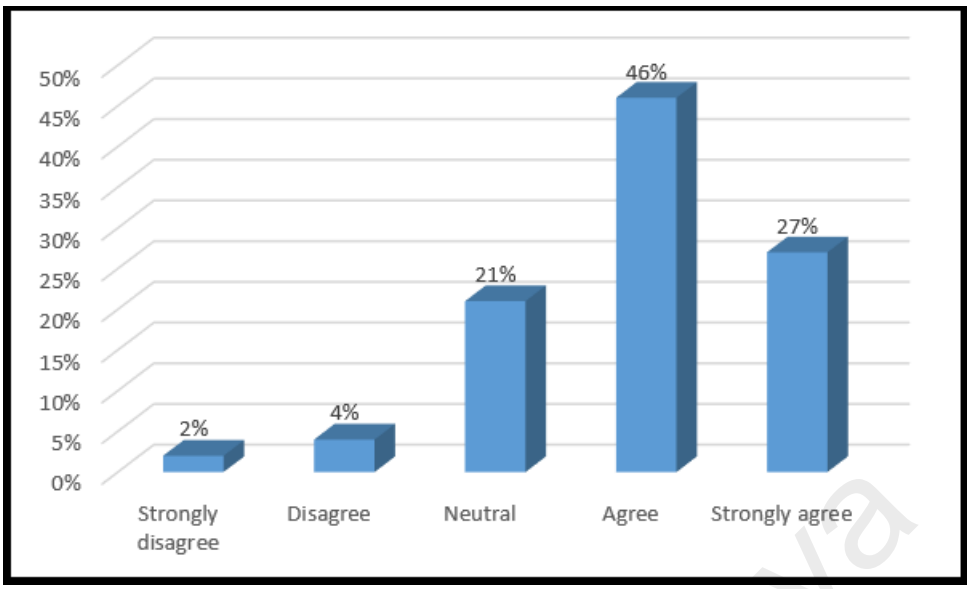

Figure 4.32: Student Perception about Computer Use in Faculty

4.3.3.5 Behavioral Intention

Figure 4.33 to 4.36 depicted responses of students on indicator statements behavioral intention indicating the majority students in agreement on their intention to use ICT with indicator mode of four (4). Behavioral Intention is denoted as BI.

BI1 indicator statement is “I Plan to Learn ICT skills”.

Figure 4.33 showed high percentage of students’ plan to learn ICT skills.

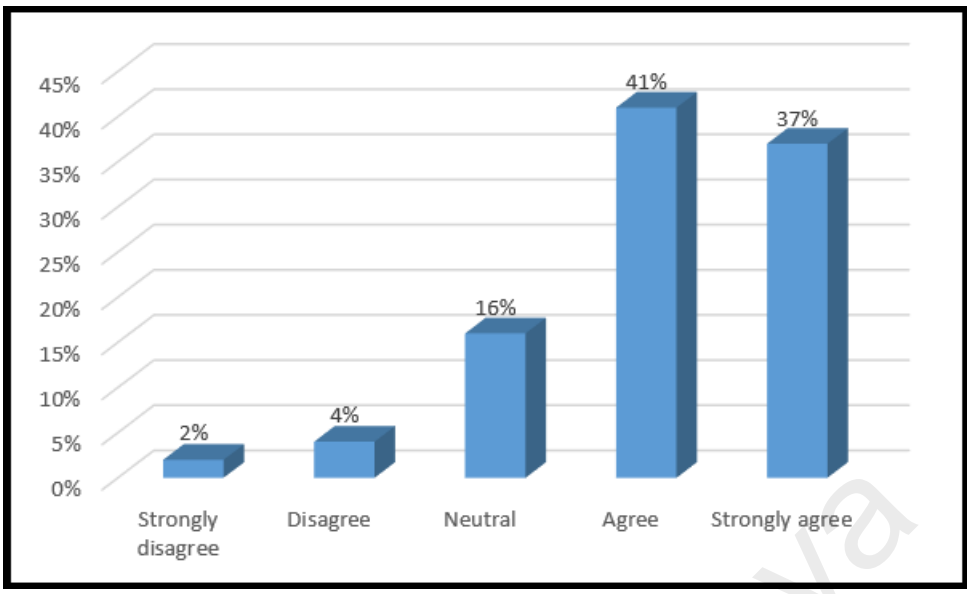

Figure 4.33: Students' Plan To Learn ICT Skills

BI2 indicator statement is "I predict I will learn ICT skills".

Figure 4.34 indicated that majority of the students predicted that they will learn ICT skills.

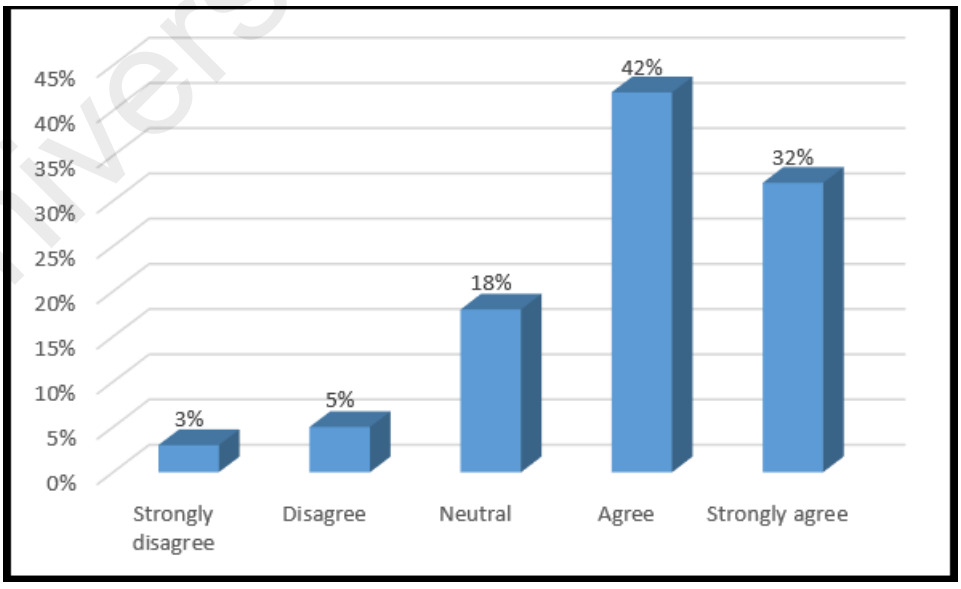

Figure 4.34: Prediction to Learn ICT Skills

BI3 indicator statement is “I intent to use ICT skills”.

Figure 4.35 indicated that most of the students’ have intent to use ICT.

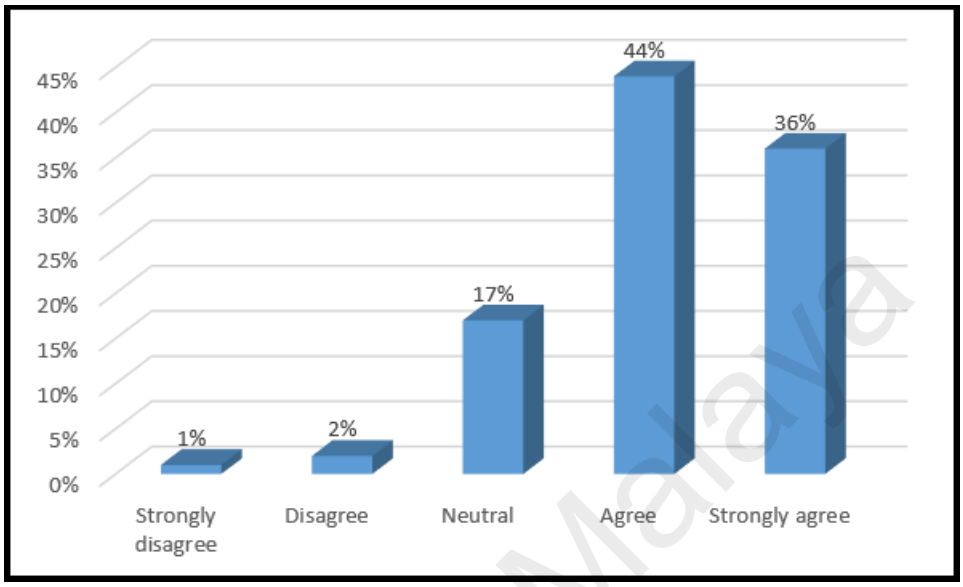

Figure 4.35: Student Intention to Use ICT Skills

BI4 indicator statement is “I intent to use ICT as often as I needed”.

Figure 4.36 presented that high number of students’ intended to use ICT as often as they need it.

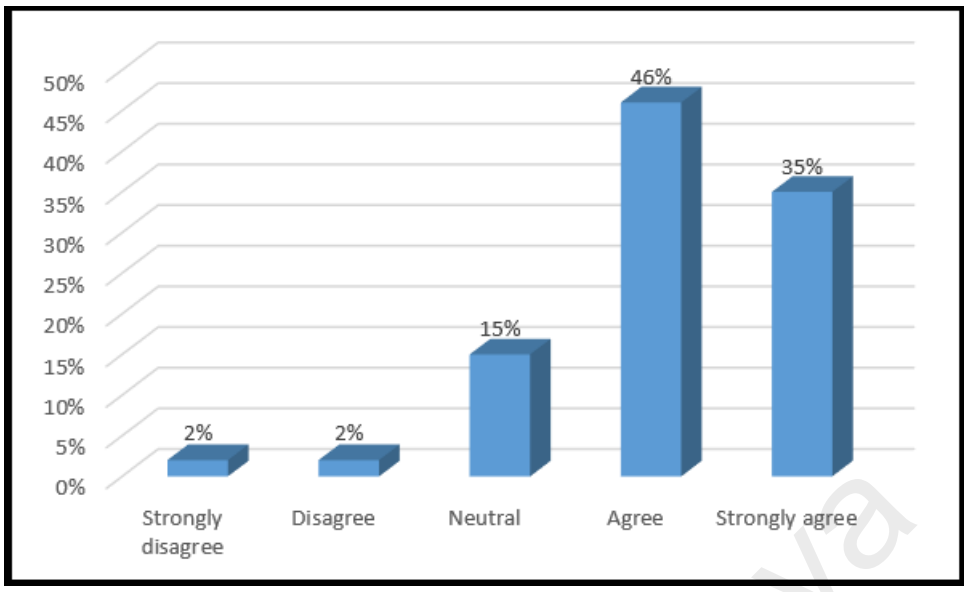

Figure 4.36: Student Intention to Often use ICT

4.3.3.6 Behavior Use

Figure 4.37 - 4.40 below indicated the student responses to the actual behavior use of ICT indicator statements with an indicator mode of four (4) indicating that many students agreed that always use the ICT. Behavior Use is denoted as BU.

BU1 indicator statement is “I have used the ICT a lot in the past and ICT is good to use”.

Figure 4.37 showed that most of the students agreed that they have used ICT in the past and they said that using ICT is of good use. This indicated the students’ continuous use of ICT.

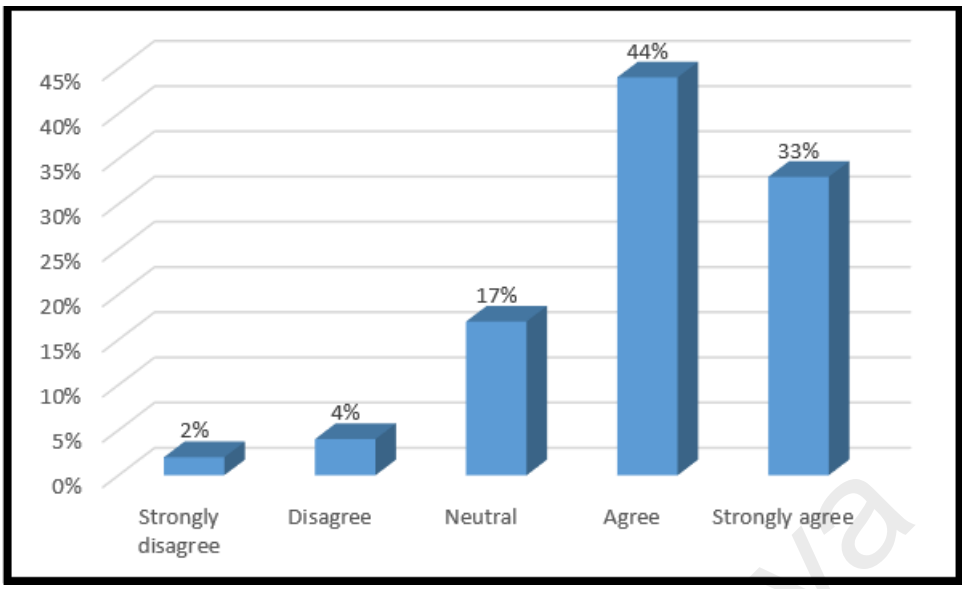

Figure 4.37: Use of ICT in the Past

BU2 indicator statement is "I use the ICTs when learning in class".

Figure 4.38 indicated that that high percentage of students strongly agreed and agreed that they use ICT when learning in classes.

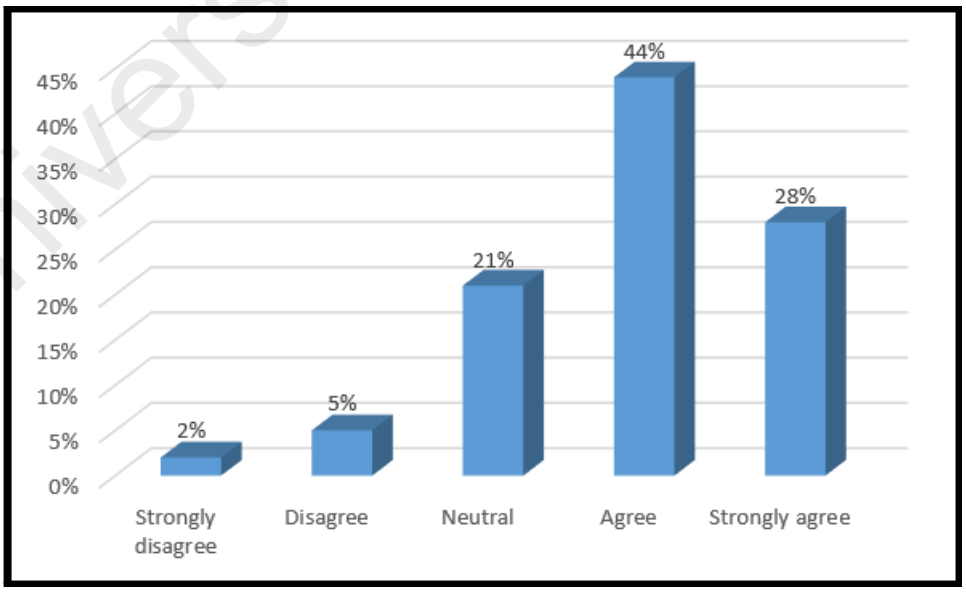

Figure 4.38: ICT Use When Learning in Classes

BU3 indicator statement is “I use the ICTs for accessing personal materials”.

Figure 4.39 highlighted that most of the students agreed that they use ICT for accessing personal materials. This indicated that the students used ICT for personal use as well.

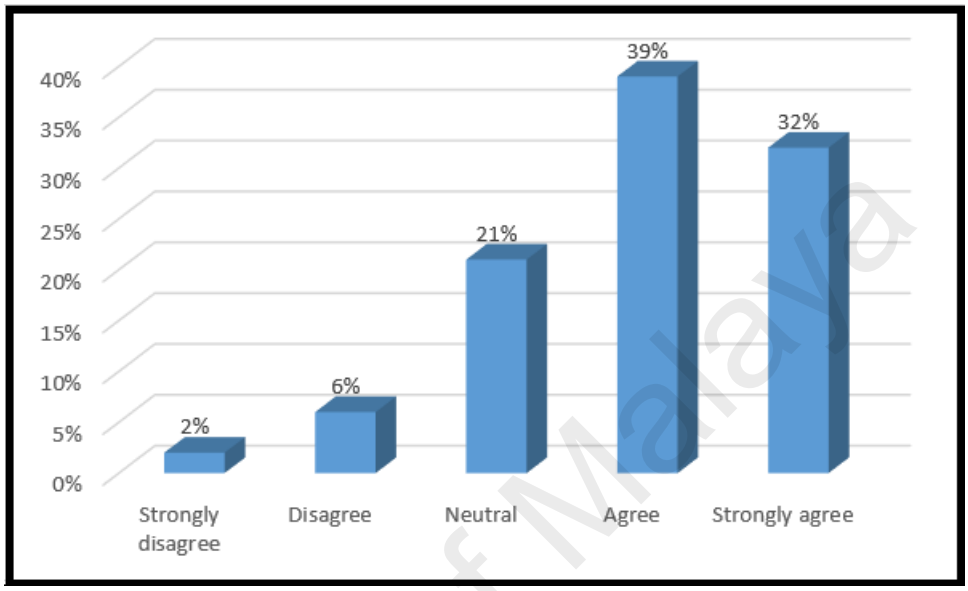

Figure 4.39: ICTs for Accessing Personal Materials

BU4 indicator statement is “I use the ICTs for future employment”.

Figure 4.40 showed that majority of the students agreed that they are use ICT for future employment.

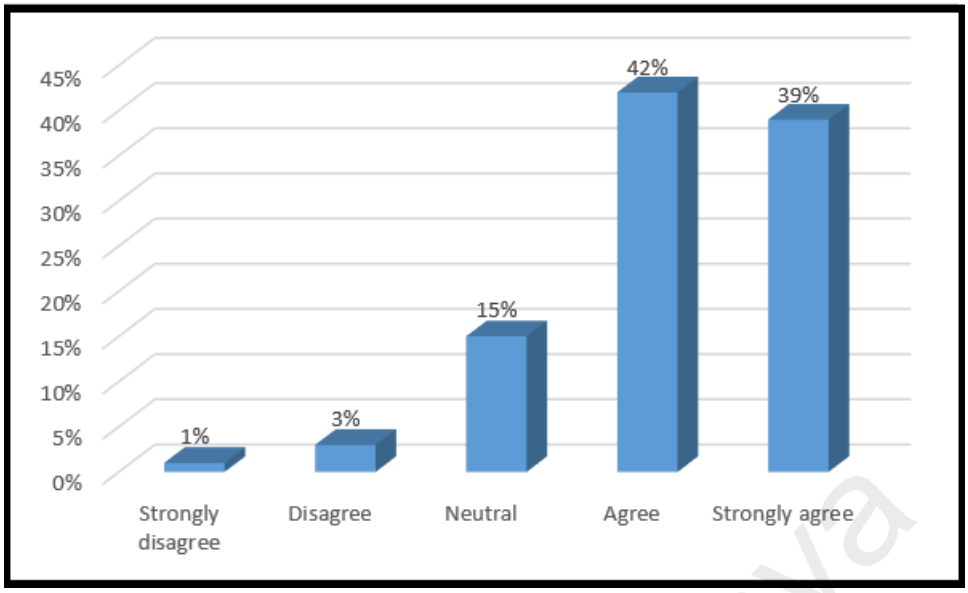

Figure 4.40: Use ICT for Future Employment

4.4 ICT Competency

In this research, one of the method used to capture the level of students' ICT skill is by conducting an ICT competency test. The ICT competency test was done based on ICDL components. The ICT competency test is used to measure the ICT skills for participates (Ahmad et al., 2014; Carla et al., 2007). The test was taken by all the research respondents consisting of 504 students. Based on the competency test only 160 of the students passed the ICT competency test. Figure 4.41 below represented the result of the ICT competency test.

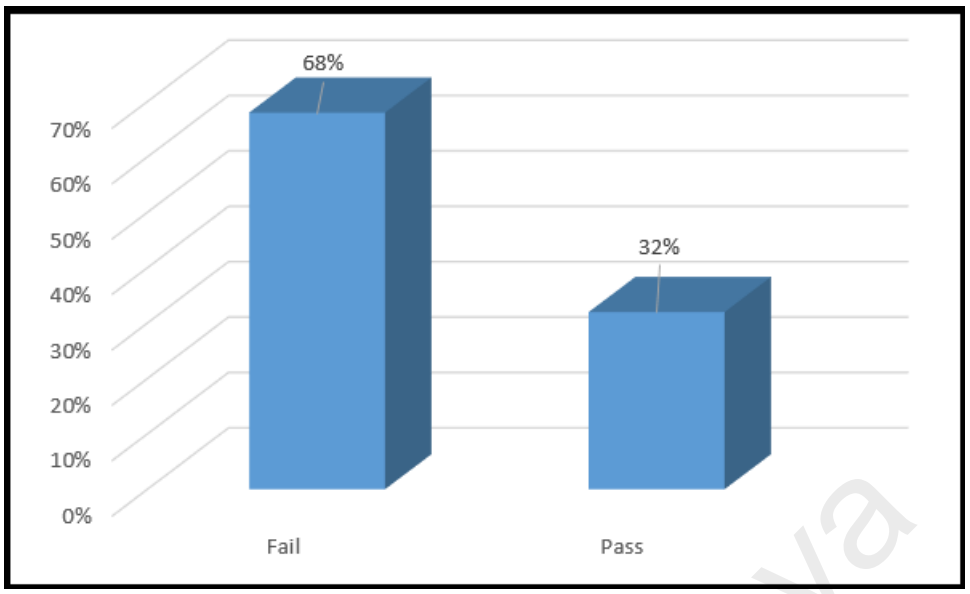

Figure 4.41: ICT Competency Test

This section discussed the analysis of the ICT competency test done on 504 students based on the Malaysia ICDL. The test is divided based on several categories which include Microsoft office basic questions, database question as well as internet and general questions. The respondents are being given 105 questions to be answered (refer to Appendix A Part C). The analysis of the result of the ICT test based on the respondents' enrolled program in their universities shown in Table 4.2.

Based on Table 4.2, most of the respondents failed the ICT test proving the call for ICT skills need to be further developed among the students.

Table 4.3: ICT Test Result

Program of the Study	Pass %	Fail %	Total
Computer & Technology	52	40	92
Engineering & Technical Skill	20	70	90
Business Administration & Management	22	45	67
Science & Mathematics	19	47	66
Social Science	7	43	50
Medicine	7	20	27
Agriculture	4	17	19
Health & Welfare	1	17	18
Education	1	16	17
Art, Design and Music	3	7	10
Law	0	7	7
Communication	2	4	6
Humanities	1	4	5
Manufacturing & Construction	0	4	4
Hospitality & Tourism	0	3	3
Aviation & Maritime	1	1	2

4.5 Chapter Summary

This chapter described the data collection method and the research instrument used in collecting empirical data for this research. The chapter consists sections on data collection background, sample sizes and biographical details of the undergraduate students at Malaysian universities followed with the of the survey's responses analysis presented as summative information and descriptive of the statistics. The following chapter presents the data analysis and findings of the research.

CHAPTER 5: DATA ANALYSIS AND FINDING

5.1 Introduction

This chapter discusses the detailed analysis done on the data collected based on the analysis techniques introduced in Chapter Three. Chapter Five began with data preparation, cleaning and screening. This is then followed with the outer measurement model regression analysis and inner model structure presented followed by the moderating effects theorized. This chapter also helped to answer the research questions as stated in Chapter 1.

5.2 Measurement Models

In order to identify affecting factors of the students' ICT skills as stated in the first research question in Chapter 1 it was done by doing the measurement models of the factors identified in Chapter 2.

The measurement model is one of the criteria for assessing partial model structures as explained in Chapter Three. The validation of the model outer reflective measurement based on (Hair et al., 2011; Hair et al., 2013) guidelines. Relationships approximations of the LV and their indicators reflective outer loadings indicators were studied.

Table 5.1 contains the removal of unreliable indicators items based on the statistical analysis done, where the removed items are bolded in the table while * sign refer to the sequence items removed (see Table 5.1).

The items being removed in sequence, included:

1- Anx1: (I feel apprehensive about using computer).

2- Anx2: (I hesitate to use the computer for fear of making mistakes).

3- SeEf1 :(I could learn ICT very well if I had a lot of time and resources).

4- SelEf2: (I could complete any task related to my work using computer if I got assistance).

5- AvTim1 (I don't have time to learn and use ICT).

6- SI1: (People who influence my behavior think that I should learn ICT skills).

7- SI2 (Lecturer in my institution have been helpful in the use of ICT).

All these items listed as in Table 5.1 below have the proposed 0.70 loading value hence they were thought as unreliable in the analysis of data as they were unable to provide associated latent variable explanations (Az-Eddine & Oumlil, 2013; Urbach, 2010).

Table 5.1: Analyzing Indicator Reliability, Internal Consistency Reliability and Convergent Validity in Students' Outer Measurement Model

Latent Variable (LV)	LV Indicator Items	Indicator Outer Loading		Indicator Reliability		Composite Reliability (CR)		Average Variance Extracted (AVE)	
		*1st	Final	*1st	Final	1st	Final	1st	Final
Behavior Use of ICT	BU1	0.859	0.859	0.74	0.74	0.86	0.86	0.60	0.60
	BU2	0.789	0.789	0.62	0.62				
	BU3	0.726	0.726	0.53	0.53				
	BU4	0.725	0.725	0.53	0.53				
Behavioral intention	BI1	0.892	0.892	0.79	0.79	0.93	0.93	0.78	0.78
	BI2	0.852	0.852	0.73	0.73				
	BI3	0.916	0.916	0.74	0.74				
	BI4	0.866	0.866	0.75	0.75				
Attitude	Att1	0.830	0.830	0.69	0.69	0.89	0.89	0.67	0.67
	Att2	0.832	0.832	0.69	0.69				
	Att3	0.780	0.780	0.61	0.61				
	Att4	0.826	0.826	0.68	0.68				
Anxiety	Anx1	***-0.116***	*1st	***0.013***	---	***0.52***	0.93	***0.44***	0.86
	Anx2	***-0.165***	*1st	***0.027***	---				
	Anx3	0.920	0.921	0.84	0.84				
	Anx4	0.933	0.935	0.87	0.87				
Self-efficacy	SelEf1	***0.689***	*2nd	***0.47***	---	0.82	0.84	0.53	0.72
	SelEf2	0.702	***0.636*** 5th	***0.49***	***0.40***				
	SelEf3	0.769	0.876	0.59	0.76				
	SelEf4	0.749	0.817	0.56	0.66				
Time	Time1	***0.691***	*3rd	***0.47***	---	0.84	0.84	0.57	0.64
	Time2	0.807	0.817	0.65	0.66				
	Time3	0.715	0.724	0.511	0.52				
	Time4	0.806	0.850	0.64	0.72				
Performance expectancy	PE1	0.904	0.904	0.81	0.81	0.95	0.95	0.82	0.82
	PE2	0.901	0.901	0.81	0.81				
	PE3	0.907	0.907	0.82	0.82				
	PE4	0.904	0.904	0.82	0.82				

Table 5.1: Continued

Latent Variable (LV)	LV Indicator Items	Indicator Outer Loading		Indicator Reliability		Composite Reliability (CR)		Average Variance Extracted (AVE)	
		*1st	Final	*1st	Final	1st	Final	1st	Final
Effort Expectancy	EE1	0.703	0.703	0.50	0.50	0.88	0.88	0.65	0.65
	EE2	0.708	0.708	0.51	0.51				
	EE3	0.882	0.882	0.78	0.78				
	EE4	0.899	0.899	0.81	0.81				
Social Influence	SI1	0.725	***0.693*** 6th			0.85	0.87	0.59	0.77
	SI2	***0.687***	*4th	***0.47***	--				
	SI3	0.823	0.838	0.68	0.70				
	SI4	0.827	0.911	0.68	0.83				
Facilitating Condition	FC1	0.721	0.721	0.52	0.52	0.87	0.87	0.62	0.62
	FC2	0.830	0.830	0.69	0.69				
	FC3	0.792	0.792	0.63	0.63				
	FC4	0.812	0.812	0.66	0.66				

Table 5.2 below provided reliability of retained indicators loadings summation (loading value squared), internal consistency reliability (composite reliability values above 0.7) and convergent validity (average variable extracted above 0.5).

Table 5.2: Summary of Internal Consistency Reliability, Indicator Reliability and Convergent Validity in Students' Outer Measurement Model

Latent Variable (LV)	LV Indicator Items	Indicator Outer Loading	Indicator Reliability	Composite Reliability (CR)	Average Variance Extracted (AVE)
Behavior Use of ICT	BU1	0.85	0.74	0.86	0.60
	BU2	0.78	0.62		
	BU3	0.72	0.53		
	BU4	0.72	0.53		
Behavioral intention	BI1	0.89	0.79	0.93	0.78
	BI2	0.85	0.73		
	BI3	0.91	0.74		
	BI4	0.86	0.75		
Attitude	Att1	0.83	0.69	0.89	0.67
	Att2	0.83	0.69		
	Att3	0.78	0.61		
	Att4	0.82	0.68		
Anxiety	Anx3	0.921	0.84	0.93	0.86
	Anx4	0.935	0.87		

Table 5.2: Continued

Latent Variable (LV)	LV Indicator Items	Indicator Outer Loading	Indicator Reliability	Composite Reliability (CR)	Average Variance Extracted (AVE)
Self-efficacy	SelEf3	0.876	0.76	0.84	0.72
	SelEf4	0.817	0.66		
Time	Time2	0.817	0.66	0.84	0.64
	Time3	0.724	0.52		
	Time4	0.850	0.72		
Performance expectancy	PE1	0.904	0.81	0.95	0.82
	PE2	0.901	0.81		
	PE3	0.907	0.82		
	PE4	0.904	0.82		
Effort Expectancy	EE1	0.703	0.50	0.88	0.65
	EE2	0.708	0.51		
	EE3	0.882	0.78		
	EE4	0.899	0.81		
Social Influence	SI3	0.838	0.70	0.87	0.77
	SI4	0.911	0.83		
Facilitating Condition	FC1	0.721	0.52	0.87	0.62
	FC2	0.830	0.69		
	FC3	0.792	0.63		
	FC4	0.812	0.66		

Cross loading as seen in Table 5.3 showed higher designated construct indicator loadings comparatively for each constructs it can be conferred that the constructs of the models differs.

Table 5.4 showed Fornell-Larcker discriminant validity criterion evidence of individual reflective construct and the reliable indicators remaining. LV's highest squared correlation with any other LV which is the similar square root of the AVE correlation comparison should be less compare to the AVE of each LV.

Table 5.3: Cross Loadings Showing Discriminant Validity in Different Construct's Indicators in the Students' Outer Measurement

	Discriminate validity	BU	BI	Att	Anx	SelEf	Time	PE	EE	SI	FC
BU1	**YES**	**0.86**	0.63	0.61	0.62	0.52	0.57	0.57	0.60	0.36	0.58
BU2		**0.79**	0.54	0.54	0.52	0.42	0.44	0.45	0.48	0.34	0.47
BU3		**0.73**	0.42	0.43	0.36	0.52	0.50	0.46	0.45	0.31	0.77
BU4		**0.72**	0.55	0.47	0.49	0.49	0.65	0.54	0.65	0.41	0.49
BI1	**YES**	0.58	**0.89**	0.52	0.57	0.48	0.56	0.58	0.76	0.49	0.54
BI2		0.53	**0.85**	0.51	0.51	0.42	0.48	0.51	0.70	0.43	0.46
BI3		0.65	**0.92**	0.58	0.63	0.51	0.54	0.62	0.77	0.48	0.55
BI4		0.66	**0.87**	0.60	0.65	0.53	0.53	0.63	0.72	0.42	0.56
Att1	**YES**	0.52	0.47	**0.83**	0.58	0.44	0.45	0.45	0.45	0.39	0.47
Att2		0.54	0.45	**0.83**	0.57	0.39	0.43	0.44	0.42	0.32	0.47
Att3		0.56	0.57	**0.78**	0.65	0.46	0.46	0.70	0.57	0.40	0.50
Att4		0.53	0.53	**0.83**	0.61	0.45	0.48	0.49	0.49	0.37	0.45
Anx3	**YES**	0.58	0.60	0.69	**0.92**	0.42	0.49	0.59	0.57	0.41	0.45
Anx4		0.60	0.65	0.68	**0.94**	0.50	0.51	0.72	0.64	0.45	0.51
SelEf 3	**YES**	0.58	0.50	0.51	0.50	**0.88**	0.54	0.50	0.51	0.45	0.68
SelEf 4		0.49	0.42	0.38	0.33	**0.82**	0.46	0.42	0.44	0.28	0.65

Table 5.3: Continued

	Discriminate validity	BU	BI	Att	Anx	SelEf	Time	PE	EE	SI	FC
Time2	**YES**	0.58	0.50	0.47	0.46	0.51	**0.82**	0.47	0.52	0.39	0.58
Time3		0.49	0.39	0.42	0.38	0.49	**0.72**	0.33	0.45	0.43	0.50
Time4		0.59	0.53	0.46	0.44	0.44	**0.85**	0.48	0.61	0.40	0.47
PE1	**YES**	0.60	0.62	0.59	0.62	0.48	0.52	**0.90**	0.66	0.46	0.55
PE2		0.59	0.57	0.59	0.62	0.50	0.48	**0.90**	0.60	0.39	0.54
PE3		0.59	0.61	0.58	0.65	0.46	0.46	**0.91**	0.70	0.39	0.51
PE4		0.60	0.60	0.59	0.66	0.53	0.50	**0.90**	0.65	0.42	0.57
EE1	**YES**	0.69	0.57	0.48	0.50	0.53	0.69	0.55	**0.70**	0.45	0.51
EE2		0.54	0.60	0.56	0.62	0.45	0.43	0.70	**0.71**	0.38	0.48
EE3		0.52	0.79	0.47	0.51	0.45	0.50	0.49	**0.88**	0.45	0.49
EE4		0.54	0.82	0.46	0.51	0.44	0.52	0.54	**0.90**	0.46	0.50
SI3	**YES**	0.34	0.38	0.36	0.32	0.38	0.40	0.33	0.41	**0.84**	0.36
SI4		0.44	0.51	0.43	0.48	0.39	0.48	0.46	0.52	**0.91**	0.43
FC1	**YES**	0.48	0.44	0.42	0.39	0.65	0.47	0.44	0.44	0.34	**0.72**
FC2		0.72	0.45	0.45	0.37	0.54	0.51	0.46	0.46	0.33	**0.83**
FC3		0.59	0.55	0.49	0.46	0.65	0.54	0.55	0.55	0.39	**0.79**
FC4		0.58	0.47	0.49	0.43	0.67	0.52	0.45	0.48	0.38	**0.81**

Table 5.4: Fornell-Larcker Criterion Showing Discriminant Validity between Different Constructs for Students

	Anxiety	Attitude	Behavior Intention	Behavior Use of ICT	Effort Expectancy	Facilitating Conditions	Performance expectancy	Self-efficacy	Social Influence	Time
Anxiety	1	0	0	0	0	0	0	0	0	0
Attitude	0.7406	1	0	0	0	0	0	0	0	0
Behavior Intention	0.6737	0.6245	1	0	0	0	0	0	0	0
Behavior Use of ICT	0.6385	0.6616	0.689	1	0	0	0	0	0	0
Effort Expectancy	0.6555	0.5986	0.8773	0.7035	1	0	0	0	0	0
Facilitating Conditions	0.518	0.5806	0.5991	0.759	0.6082	1	0	0	0	0
Performance expectancy	0.7067	0.6503	0.6654	0.6545	0.7226	0.5985	1	0	0	0
Self-efficacy	0.4965	0.5333	0.5488	0.634	0.5658	0.7795	0.5442	1	0	0
Social Influence	0.4659	0.4549	0.5157	0.4532	0.5376	0.4517	0.4561	0.4394	1	0
Availability ofTime	0.538	0.5621	0.5991	0.6972	0.6623	0.6409	0.5392	0.5945	0.5049	1
Sqrt (AVE)	**0.93**	**0.82**	**0.88**	**0.78**	**0.8**	**0.79**	**0.9**	**0.85**	**0.87**	**0.8**

However, statistical significance will be more dependent on the sample size than on the degree of correlation/determination. Consequently, for very large sample sizes with almost no collinearity, you may see highly statistically significant results, and vice versa (e.g., you may see very high correlation/determination without statistical significance in a small sample) (Hair, 2010).

5.3 Structural Model

Successfully validated measurement models can then analyze. The first step in assessing structural models consists of path coefficients and the model's LVs evaluation.

This is done in this research by evaluating the path coefficient's algebraic sign, eminence and prominent. Paths, whose signs are contrary to the theoretically assumed relationship, do not support the pre-postulated hypotheses. The strength of the relationship between two LVs A is indicated by path coefficient's magnitude (Urbach 2010 & Hair et al., 2011).

Next, it is important to measure LV's coefficient of determination (R2) for each endogenous. LV's explained variance to its total variance relationship is measured by R2 having the sufficiently high value for the model explanatory power. The values of approximately .670 as substantial; hence, the values around .333 are considered average, and values of .190 and lower are considered weak by this research (Urbach, 2010 & Hair et al., 2011).

According to Hair et al. (2011); Wong & Ken (2013), the PLS structural mode individual path coefficients interpreted as ordinary least squares regressions of standardized beta coefficients. Strength of the relationship between two LVs, is indicated by magnitude of path coefficient's Urbach (2010) said to be more than .100 for impact on the model to be accounted for (Hair et al., 2011; Urbach, 2010).

Bootstrapping procedure was used to accessed path coefficient's significance of the indicators loadings (Urbach, 2010) and are non-significant paths. Signs showing contrast direction of the hypothesis indicate non-support of the hypothesis. The hypothesized direction empirically supporting the proposed causal relationship of this research is shown by the significant path.

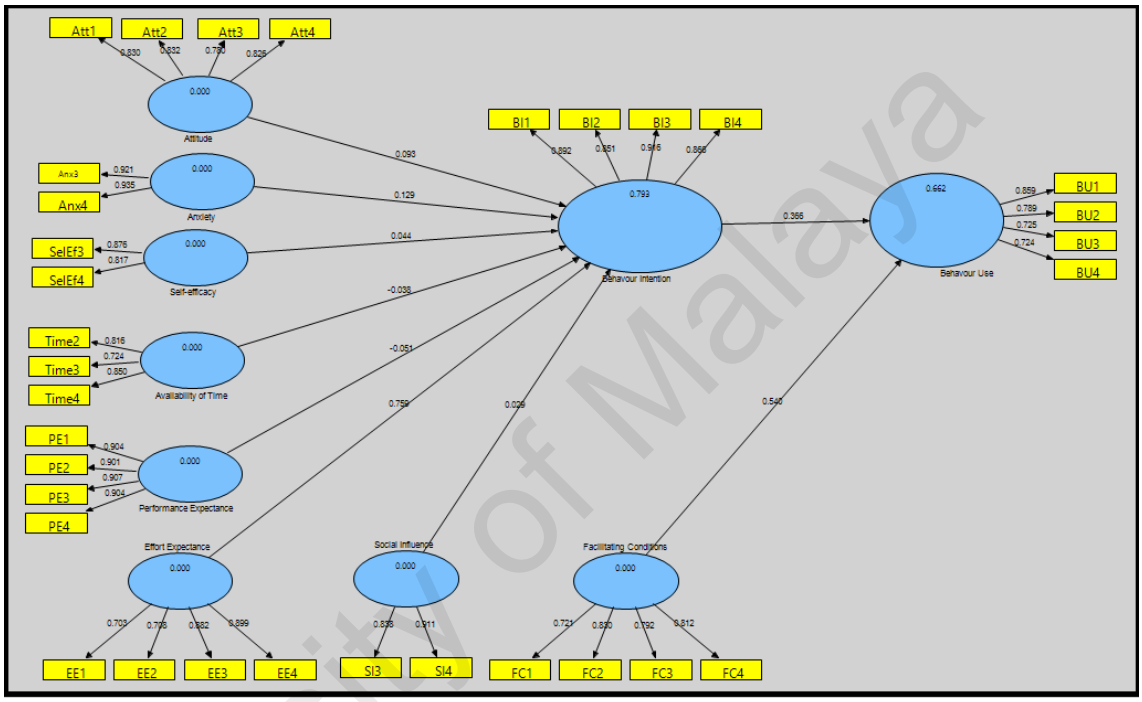

Figure 5.1: The Students' UTAUT Model Depicted in SmartPLS after PLS Algorithm Calculation

In assessing the structural model of PLS-SEM, firstly after running the PLS-SEM algorithm there is a need for path coefficients examination as it hypothesized independent and dependent constructs relationships representations (Hair et al., 2013).

The standard error determined the path coefficients prominent obtained by SmartPLS bootstrapping (Hair et al., 2013). This research with a student's sample (n=504), the empirical t-value has to be larger than the critical t value (1.96) at a significance level of five percent (5%), and the p value less than 0.05 for the hypothesized significant relationships as seen in Table 5.5.

Table 5.5: Path Coefficients Significance Testing Students Structural Model

Relation	Path coefficient	T Value	P Value
Anx → BI	0.129	2.843	0.004650842
Att → BI	0.093	2.4778	0.013546756
BI→ BU	0.366	9.0677	2.72256E-18
EE → BI	0.759	18.1575	4.93151E-57
FC → BU	0.540	16.1181	2.0055E-47
PE → BI	-0.051	1.3267	0.185209923
SelEf → BI	0.044	1.2785	0.201662777
SI → BI	0.029	1.0115	0.312263492
Time → BI	-0.038	1.2064	0.228230393

Note: NS = Not Significant

** <0.05

The coefficient of determination (R2) accuracy of the predictive framework's measurement (Hair et al., 2013) can be seen in Table 5.6.

Table 5.6: Endogenous LV's R^2 for the Students' Structural Model

Constructs	R square
BI	0.793
Actual use of ICT	0.662

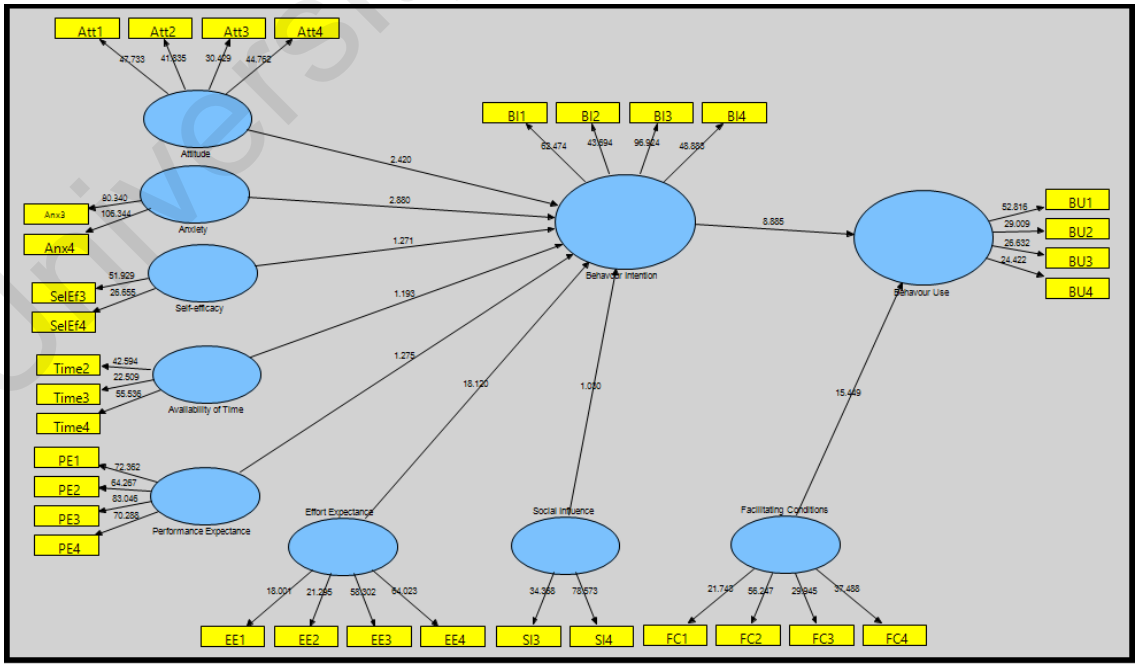

Figure 5.2: Bootstrapping

5.4 Moderation

Having described the relationships of the UTAUT constructs for the student's ICT skills, conditions of the constructs works need to be understood. Moderation size and sign in explaining two variables relationship dependable on other set of variables (Andrew, 2013). Coding gender male as 1 and female as 0 for female as dummy variable (Venkatesh & Davis, 2000; Venkatesh et al., 2003) and coding age as a continuous variable, consistent with previous research (Venkatesh & Davis, 2000). Coding experience coded value of 1,2,3,4 via dummy variable to determine students' experience ICT skills level using an ordinal dummy variable (Venkatesh & Davis, 2000). Voluntary of use was coded via dummy variables, 0 represent disagreed on the voluntary of ICT use could affect the student's ICT skills while 1 represent the agreement by the students. Finally, the ICT competency test result was represented by dummy variable as well, 0 for students who failed and 1 for students who passed the ICT competency test.

Table 5.7: Path Coefficients Significance Testing Moderating Affect

Relation	T Value	P Value
Anx*ICTC → BI	0.0846	0.932613059
Att*ICTC → BI	0.7647	0.444808808
SelEf*ICTC → BI	1.1511	0.250238
PE*ICTC → BI	0.8738	0.382644159
PE*Gender→ BI	0.7115	0.477104278
PE*Age→ BI	1.0707	0.284817828
PE*Exp → BI	1.4586	0.145299363
EE*ICTC → BI	0.8315	0.406085774
EE*Gender → BI	0.866	0.386903031
EE*Age → BI	0.4495	0.653264633
EE*Exp → BI	1.0888	0.276763474
SI*ICTC → BI	1.0486	0.294865828
SI*Gender → BI	1.1463	0.252216061
SI*Age → BI	1.7531	0.08019399
SI*Exp → BI	0.8951	0.371161757
SI*VolOfUse → BI	0.3411	0.733170734
FC*Age → BU	0.2824	0.777752978
FC*Exp → BU	0.3758	0.707224023

Note: NS = Not Significant

** <0.05

When running the moderating interaction analysis for all factors of the moderating variables (gender, age, experience, voluntary of use, and ICT competency test) it was found that gender as the moderating factor affecting ICT skills with its significance on the UTAUT constructs which include performance expectancy (PE), effort expectancy (EE), and Social influence (SI). The result of the moderating affecting factor gender on the relation between performance expectancy (PE) and behavior intention (BI) is insignificant because of the t value 1.1463 is less than 1.96 and p value 0.477 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor of gender on the relation between effort expectancy (EE) and behavior intention (BI) is insignificant because of the t value 0.866 is less than 1.96 and p value 0.386 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor gender on the relation between Social influence (SI) and behavior intention (BI) is insignificant because of the t value 1.1463 is less than 1.96 and p value 0.252 greater than 0.05 at the two tailed ninety-five percent (95%) significant level.

The moderating affecting factor age and its significance on the UTAUT constructs including performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). The result of the moderating affecting factor age on the relation between performance expectancy (PE), and behavior intention (BI) is insignificant because of the t value 1.0707 is less than 1.96 and p value 0.284 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor age on the relation between effort expectancy (EE) and behavior intention (BI) is insignificant because of the t value 0.4495 is less than 1.96 and p value 0.653 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor age on the relation between social influence (SI) and behavior intention (BI) is insignificant because of the t value 1.7531 is

less than 1.96 and p value 0.080 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor age on the relation between facilitating conditions (FC) and behavior use of ICT (BU) is insignificant because of the t value 0.2824 is less than 1.96 and p value 0.777 greater than 0.05 at the two tailed ninety-five percent (95%) significant level.

The moderating affecting factor experience and its significance on the UTAUT constructs such as effort expectancy (EE), social influence (SI), and facilitating conditions (FC). The result of the moderating affecting experience on the relation between effort expectancy (EE) and behavior intention (BI) is insignificant because of the t value 1.4586 is less than 1.96 and p value 0.145 greater than 0.05 at the two tailed ninety-five percent (95%) significant level.

The result of the moderating affecting factor experience on the relation between social influence (SI) and behavior intention (BI) is insignificant because of the t value 0.8951 is less than 1.96 and p value 0.371 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor experience on the relation between facilitating conditions (FC) and behavior use of ICT (BU) is insignificant because of the t value 0.3758 is less than 1.96 and p value 0.707 greater than 0.05 at the two tailed ninety-five percent (95%) significant level.

The moderating affecting voluntaries of use on and it is significance on the UTAUT construct which include social influence (SI). The result of the moderating affecting factor voluntaries of use on the relation between social influence (SI) and behavior intention (BI) is insignificant because of the t value 0.3411 is less than 1.96 and p value 0.733 greater than 0.05 at the two tailed ninety-five percent (95%) significant level.

Finally testing the moderating affecting factor of extended moderator variables on the extended factors as well as to UTAUT constructs based on the proposed model. This research has extended moderator variable, i.e. the ICT competency (ICTC) test. The moderating affecting factor ICT competency (ICTC) test and its significance on external variables such as psychological factors which include attitude (Att), anxiety (Anx), and self-efficacy (SelEf)), availability of time and UTAUT constructs performance expectancy (PE), effort expectancy (EE), Social influence (SI), and facilitating conditions (FC).

The result of the moderating affecting factor ICTC on the relation between attitude (Att) and behavior intention (BI) is insignificant because of the t value 0.7647 is less than 1.96 and p value 0.444 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor ICTC on the relation between anxiety (Anx) and behavior intention (BI) is insignificant because of the t value 0.0846 is less than 1.96 and p value 0.932 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting factor ICTC on the relation between self-efficacy (SelEf)) and behavior intention (BI) is insignificant because of the t value 1.1511 is less than 1.96 and p value 0.250238 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting ICTC on the relation between available time (AvTim) and behavior intention (BI) is significant because of the t value 2.2539 is greater than 1.96 and p value 0.0246 less than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting ICTC on the relation between performance expectancy (PE) and behavior intention (BI) is insignificant because of the t value 0.8738 is less than 1.96 and p value 0.382 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting ICTC on the relation between effort expectancy (EE) and behavior intention (BI) is insignificant because of the t value 0.8315

is less than 1.96 and p value 0.406 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. The result of the moderating affecting ICTC on the relation between social influence (SI) and behavior intention (BI) is insignificant because of the t value 1.0486 is less than 1.96 and p value 0.294 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. Finally, the result of the moderating affecting ICTC on the relation between facilitating conditions (FC) and behavior use of ICT (BU) is insignificant because of the t value 1.5758 is less than 1.96 and p value 0.115 greater than 0.05 at the two tailed ninety-five percent (95%) significant level. Refer to Figure 5.3 that shows the bootstrapping for the moderator factors.

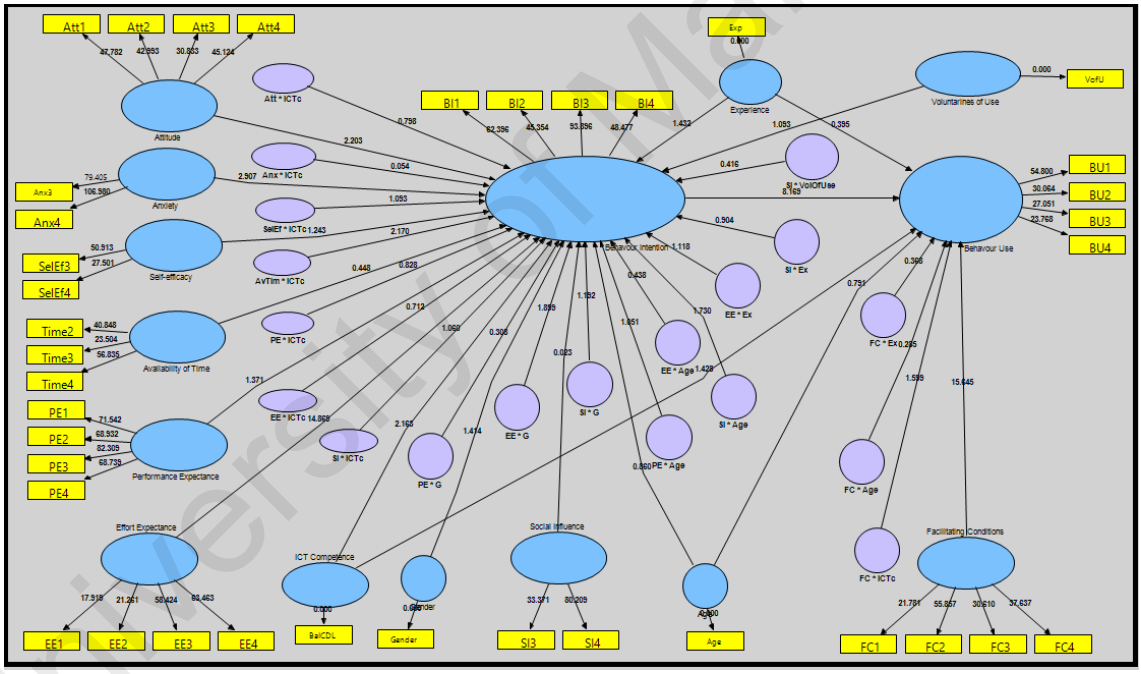

Figure 5.3: Final SmartPLS Bootstrapping Analysis on Student Model's Moderation

5.5 Factors Affecting Students' ICT Skills and Hypothesis Testing

In determining the impact of the factors that affect students' ICT skill as stated in objectives two in Chapter One, the relationship of these factors and variable moderators as in the proposed model were investigated.

The third research objective of this research is how to build a predictive framework to predict factors affecting students' ICT skills. This research then mapped these impact factors on UTAUT exogenous constructs as well as the external factors combined to UTAUT on the student's behavioral intention and behavior use.

5.5.1 Psychological Factors

5.5.1.1 Attitude

The findings of the data analysis indicated that attitude significantly affect the behavior intention of students to learn ICT skills. The data analysis showed positive and significant relationship between attitude and behavior intention to learn ICT (Att – BI) path coefficients (0.093, t= 2.4778). The result contradicted with Ahmad (2014) study which demonstrated that the effect of attitude toward behavior intention is insignificant and omitted from the study. Although the finding of this research was not similar with the above author' finding yet the finding that attitude and behavior intentions positive relationships were supported with the work of (Cheong & Park, 2005; Suki et al., 2012; Timothy & Lee, 2010). Suki et al. (2012) investigated factors influencing Facebook behavior intention to use indicating that perceived enjoyment, perceived ease of use, perceived usefulness, and attitude are determinants of Facebook behavior intentions, so the result supported this research finding. Likewise, based on Al Rababaa (2013) m-commerce study conducted in Jorden (2010) the researcher found attitudes positively affect m-commerce use by Jordanians. In addition, Cheong & Park (2005) found that

attitude, perceived playfulness and the usefulness as significant determinant to mobile internet.

Wit et al. (2014) study showed positive students attitude toward ICT used. In addition, Timothy & Lee (2010) found that attitude has significant impact on behavior intention to use technology. Furthermore, Hunsinger & Smith (2008) identified that factors that influence undergraduates of Information Systems to enroll IT certification include attitude, subjective norm, and perceived behavioral control significantly influence behavioral intention.

The findings of this research found that among the most important influence on behavior intention is attitude and indicated that attitude affect emotion. Therefore, the finding of this research in consistent with Cheong & Park (2005) findings that confirmed that attitude positively affect the behavior intentions.

Based on these empirical result, the study accepted H_1.

H_1: Attitude positively influence the behavior intention of students to learn ICT.

5.5.1.2 Anxiety

Anxiety is one of the psychological factors being considered in this research. The result of the data analysis showed that anxiety significantly contribute towards behavior intention of students to learn ICT skills. Anxiety is also considered as the most contributive variable amongst other psychological variables. In the study's the relationship between anxiety and behavior intention of students to learn ICT proven positive and significant (Anx- BI) path coefficients (0.129, t=2.843) and results obtained supported extensively the literature review.

Computer anxiety confirmed by many studies as most significant contributive variable

having positive relationships and affect technology acceptance (Celik & Yesilyurt, 2013; Chuo et al., 2011). Confirming of computer anxiety on the usage intention of e-learning system was affected by support from organization and self-efficacy. Yesilyurt (2013) found that computer supported education important predictors was computer anxiety.

Even though Karuri et al. (2013) suggested that behavioral intention significant influence by computer anxiety because its affect captured by effort expectancy existence. But many other prior researchers supported that computer anxiety have significant affect toward the student's behavior intention to learn ICT skills and need to be taken into account future investigation related to the students' ICT skills. Hence, based on the empirical result, this research accepted H3.

H_3: Anxiety positively influence the behavior intention of students to learn ICT.

5.5.1.3 Self – Efficiency

The analysis sought out that computer self-efficacy is insignificantly influenced by the behavior intentions of students to learn ICT. The inferential statistics show that the Self-efficacy → behavioral intention (SelEf-BI) is positive and insignificant (0.044, t = 1.2785) path coefficient. However, the insignificant effect of self-efficacy was also confirmed by previous literature where Ahmad (2014) indicated that self-efficacy had no significant affect on the behavior intention, therefore, it was omitted from the study. Similarly, Chen (2011) indicated that there is no self-efficacy and behavior intention relationship. Despite the findings of these previous researchers, there are also many prior researchers that confirmed the positive influence of self-efficacy on the behavior intention of technology acceptance (Dwivedi et al., 2011; Din & Wang, 2009). Therefore, the result obtained for this research can be rationalized by the following reasons. Firstly, the findings can be of variance owing that the relationship of self-efficacy influence to particular settings such as age or the type of the specific ICT skills, as most of the previous

studies were on the e-learning; none of the previous researches did study on ICT skills. Wang (2009) revealed that self-efficacy had a significant affect on behavior intentions. Secondly, the self-efficacy could have influenced by the culture difference because some of the previous studies indicated that the self-efficacy could be affected by culture.

Based on these empirical result, the study rejected H_5.

H_5: Self-efficacy positively influence the behavior intention of students to learn ICT skills.

5.5.2 Availability of Time

The result of the analysis showed that availability of time insignificantly influences the behavior intention to learn ICT skills. The inferential statistics showed that the availability of time → behavioral Intention (AvTim-BI) path coefficient is negative and insignificant (-0.038, t = 1.2064). Refer to Table 5.7.

However, the obtained findings regarding to the availability of time were inconsistent with some of the previous studies. Afshari et al. (2009) found that the availability of time was considered as the most critical factor that affecting students and lecturer, lack of student's time and lack of lecturer time. The availability of time to use computers was also found to affect ICT use. The findings of this research found that almost 60% of students reported that they would use the computers more often if they had more time. Furthermore, Livingstone (2015) indicated that availability of time determines teaching and learning ICT use. It was also found that the lack of available time in classes and in teachers' own schedules for planning is a major factor influencing ICT integration in teaching. In another study carried out in Saudi Arabia showed that time is an important factor affecting the application of new technologies in science education and is attributed to busy school schedules since teachers work from about 7.00 am to 2.00 pm and have on

average 18 lessons per week. Both teachers and students have little time to work on integrating ICT in science education.

Based on these empirical result, the study Rejected H_7.

H_7: Availability of time positively influence the behavior intention of students to learn ICT skills.

5.5.3 Performance expectancy

The findings of this research revealed that the performance expectancy had insignificant influence on the behavior intention to learn ICT skills. The relation between performance expectancy and behavioral intentions as reflected in the study's PE-BI path coefficients for the students (-0.051, t = 1.3267) established both negative and insignificant.

These findings of this research was in line with Robert (2012) which indicated that performance expectancy had no significant influence on behavior intentions. This finding was found to be contradicting with many researchers who had examined the influence of performance expectancy on technology acceptance (Alrawashdeh et al., 2012; Hui-Yi et al., 2010; Zhan et al., 2011), where their results showed that performance expectancy significantly affect behavior intention.

Probable cause for insignificance performance expectancy and behavior intentions relationship could be owed to the fact of students' unfamiliarity of ICT advantages. Performance expectancy unable to influence to encourage students to learn ICT skills. However, despite all that many students thought that the benefit of ICT is only for entertainment purposes instead of future employments. This means that the future acceptance of learning ICT skills depend on the perception of the respondents what ICT advantages are

Based on these empirical results, the study rejected H_8.

H_8: Performance expectancy positively influence the behavior intention of students to learn ICT.

5.5.4 Effort Expectancy

The findings revealed that the effort expectancy had a significant influence on the behavior intention to learn ICT skills. It was found that the affect of effort expectancy towards behavior intention to learn ICT skills was very strong compared to the other factors. The student's effort expectancy - behavioral intention (EE-BI) path coefficient is found positive and significant (0.759, t = 18.1575) based on the statistics inferential (see Table 5.7).

The consistent findings of this research with study of expectance on technology acceptance effort influence earlier researchers (Ahmad et al., 2012; Attuquayefio & Hilla, 2014; Hui-Yi et al., 2010; Ismail, 2010; Venkatesh et al., 2003) highlighted behavior intentions significant predictor of as effort expectancy. These results can be interpreted as universities campuses ICT resources easy access. ICT skills acceptance important factors ICT ease of use and effort expectancy and effort expectancy is important factor affecting student's ICT skills.

Based on these empirical results, the study accepted H_{12}.

H_{12}: Effort Expectancy Positively influence the behavior intention of students to learn ICT skills.

5.5.5 Social Influence

The results of the analysis of this research showed that social influence has no significant influence on the behavior intention of students to learn ICT. The social

influences (SI) and behavioral intentions (BI) served as (SI→BI) path coefficient with small positive value (0.029) that is insignificant (t = 1.0115) at the ninety-five percent (95%) significance level based on the statistics inferential (see Table 5.7).

These findings confirmed previous studies' findings (Deng et al., 2011;Gao & Deng, 2012; Wong & Dioko, 2013) displaying insignificant prediction social influence on technology use behavior intentions.

On the other hand, dissimilarity of this findings with a few prior s acceptance studies (Bakar et al., 2013; Pardamean & Susanto, 2012; Raman et al., 2015; Sahadani & Salleh, 2014) suggested social influence direct affect existence on the behavior intention. In conclusion, students will not get affect by other options to use ICT skills if they do not like it. Based on these empirical results, the study rejected $H_{17.}$

H_{17}: Social influence positively influence the behavior intention of students to learn ICT skills.

5.5.6 Facilitating Condition

The research finding indicated that the facilitating conditions factor significantly influence the behavior use of students to learn ICT skills.

The statistics infer positive and significant facilitating conditions (FC) and behavior use (BU) of ICT (FC→BU) relationship. The path coefficient is (0.540) and the t value significant (t = 16.1181) indicate that facilitating conditions was signification predictor for the behavior use of students to learn ICT skills. A plausible explanation for this result relate to adequate encouragement for students to learn ICT skills due to availability of existing facilitating conditions. The findings confirmed prior studies in different domains (Akbar, 2013; Bakar et al., 2013; Timothy & Beng, 2010; Toh, 2013) that behavior use of technology significant affected by factor facilitating conditions. There need to be a

significant role by the universities by improving their facilities infrastructure like providing more computers labs, free internet access, and providing financial support for student's benefits.

Based on these empirical results, the study accepted $H_{23.}$

H_{23}: Facilitating condition positively influence the behavior use of students to learn ICT skills.

5.5.7 Behavioral Intentions

The obtained findings indicated that the behavior intention of ICT skills significantly influence the behavior use. The inferential statistics show that the relationship between behavior intention (BI) and behavior use (BU) of students are positive and significant. The path coefficient is (0.366) and the t value significant (t = 9.0677) indicating a strong and significant relationship BI and the BU, refer to Table 5.7.

The result is consistent with the previous studies (Tomás et al., 2014; Im et al., 2011; Mardikyan et al., 2012; Mursalin & Jabir, 2012; Ng, 2016) stated that behavior intention significantly affect the behavior use of technology acceptance. Therefore, this research finding could be justified since the literature review supported it.

Behavior intention in this research is used to describe how big the desire of students to learn ICT (Harsono & Suryana, 2014). In order to build a predictive framework to identify the factors that affecting student's ICT skills, literature results were compared with the findings of this research specifically investigating coefficient determinations (R2) of behavioral intention as an accuracy measurement of the predictive framework (Hair Jr et al., 2013). Hair et al. (2011) expected R2 values differs based on disciplines but generally structural model endogenous LVs substantial value as 0.75, moderate value of 0.50 and weak value 0.25.

The predictive accuracy of the behavior intention (79%), indicate that the model coefficient of determinations (R2) predictive accuracy greater than (70%) of behavioral intentions as in Venkatesh et al. (2003).

By referring to the empirical results, the study accepted hypotheses $H_{26.}$

H_{26}: Behavior intention positively influence on the behavior use of students to learn ICT skills.

5.5.8 Behavior Use

Behavior use to learn ICT is used to describe the intensity of the use of ICT in daily life (Listyo & Suryana, 2014). UTAUT theorize that behavior use is predicted by behavioral intention and facilitating conditions where facilitating conditions and behavior use relationship discussed earlier. Legris et al. (2003) reviewed critically eleven acceptance model discussion based on twenty-two studies whereby self-reporting measurement behavior use of ICT used frequency and ICT time spent. In one study automatic measuring tools used to measure behavior use and no measurement of behavior used in the other studies as measurement of behavior use was found not necessary or simply not cared for (Legris et al., 2003).

Study by Alan (2013) meta-analysis of thirty-seven UTAUT studies found behavioral intention and behavior use correlations categorized the BI-BU size affect to be small. Venkatesh et al. (2003) found significant intentions and usage relationship where system logs are used for behavior use and actual use measurement. Moran (2006) employed self-measured behavioral use such as frequency used ICT or it resources.

Descriptive statistics in Figure 4.46 and Figure 4.47 indicate agreement by the students to always using ICT as indicated by indicators mode four (4).

The inferential statistics show that the model explained forty-eight (48%) variance in the behavior use, see Table 5.8. This value indicates moderate predictive accuracy to explain behavior use of students to learn ICT skills. The path coefficients between BI and BU (0.38, t = 9.67) is positive and significant.

Based on the analysis result in chapter five and the hypothesis testing in the current chapter, Figure 6.1 illustrate the finial ICT skills predictive framework.

5.6 Moderator Roles of the Demographic Variables

Moderation means variables affect depending on other variables. Moderator affects can be tested commonly with moderator interaction predicting scores of dependent variable known as moderating relationship. Significant regression coefficient interaction score indicates significant interaction. In the present study some of the demographic variables were used as moderators and coded 0, 1 dummy format. Dichotomous moderator variable required separate moderator variable level test run analysis. An intense regression analysis done to determine significance interactions of proposed factors. Table 5.7 indicated the interactions of eight factors and five moderators on the behavior intention and behavior use of students to learn ICT skills.

The moderation analysis of ICT competency (ICTC) on the relationship between attitude and behavior intention of students to learn ICT (Att → BI) at ninety-five percent (95%) significant level as insignificant having a value less than 1.96 for t value and p value greater than 0.05 two tailed test, refer Table 5.7. Based on the literature, there are lack of studies used ICT competency in the technology acceptance. Yusuf & Balogun (2011) study indicated positive use of ICT attitude majority users in education environment and indicated few basic ICT tools competency. Moreover, another research study approved that increase in ICT competency in general also leads to more positive attitudes to using ICT. However, contrasted with the present research. The finding of this

study indicated that ICT competency insignificantly affect attitude and behavior intention relationship. It could be the reason that the students believe even if they are good in the ICT competency, will not affect their attitude to learn more ICT skills.

Based on these empirical result, the study Rejected H_2.

H_2: ICT competency positively moderator the relationship between attitude and behavior intention.

The moderation analysis of ICT competency (ICTC) on the relationship between anxiety and the behavior intention of students to learn ICT (Anx →BI) insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and p value greater than 0.05 two tailed test. Refer to Table 5.7. According to Agbatogun (2010) ICT competency could affect female and cause anxiety to use computer. In addition, the following study mentioned the importance of ICDL as ICT competency toward ICT skills (Ahmad et al., 2011). However, the researcher assumed ICT competency could moderate the affect of anxiety on the behavior intention. But the finding of this study indicate that ICT competency insignificantly affect the relationship between anxiety and behavior intention. The contrasted finding with the previous studies could be the students very worry to use and learn ICT skills, especially for NON IT students, consider new stuff to them.

Based on these empirical result, the study Rejected H_4.

H_4: ICT competency positively moderator the relationship between anxiety and behavior intention.

The moderation analysis of ICT competency (ICTC) on the relationship between self-efficacy and the behavior intention of students to learn ICT (SelEf → BI) insignificant at

the ninety-five percent (95%) significant level because the t value is less than 1.96 and p value greater than 0.05 two tailed test, refer to Table 5.7. Koen Aesaert and Johan van Braak (2014) study showing that ICT competency associated with the self-efficacy of students to learn ICT skills, according to that the researcher expected ICT competency moderate the relation between self-efficacy and behavior intention. However, the finding of this study indicate that ICT competency insignificantly affect the relationship between self-efficacy and behavior intention. Students believe nothing affect their confidence to learn ICT skills, when they have high confidence so they will learn more and be skillful.

Based on these empirical result, the study Rejected H_6.

H_6: ICT competency positively moderator the relationship between self-efficacy and behavior intention.

The moderation analysis of gender, age and ICT competency for performance expectancy and the behavior intention (PE → BI) relationships. The moderating affect of gender between performance expectancy and behavioral intention relationship was insignificant. The relationship was insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and the p value greater than 0.05 two tailed test. Refer to Table 5.7. The study consistent with some of the previous studies (Jaradat & Mamoun, 2013; Wang et al., 2009). These studies in same field but in different line with this research. On the other hand, the finding was inconsistent with the following studies (Ghalandari, 2012; Venkatesh et al., 2003). The insignificant affect of gender it could be because of the main construct performance expectancy did not influence the behavior intention, so there is no gender different in the affect as well.

The moderation analysis of the age on performance expectancy and behavioral intention relationship was insignificant, with a very minimal path coefficient positive

value and insignificant. T-value less than 1.96 at the ninety –five percent (95%) significant level and the p-value greater than 0.05 two tailed test. Refer to Table 5.7. The study consistent with the following studies (Ahmad et al., 2012; Wang et al., 2009; Zhan et al., 2011). In contrast, this research finding inconsistent with the following studies (Evwiekpaefe, 2011; Ghalandari, 2012). The reason why no age different it could be most of the student's in same age category and unemployment yet, so they have less knowledge about the usefulness of the ICT skills in future employment.

The moderation analysis of ICT competency (ICTC) on performance expectancy and the behavior intention of students to learn ICT (ICTC*PE → BI) relationship was found as insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and p value greater than 0.05 two tailed test, refer to Table 5.7.

In contrast, the research finding inconsistent with Akpan (2015) study, his study revealed that the level of ICT competency of lecturers significantly enhanced their performance. Could be the previous study was applied on the lecturers while this study applied on the students. So the finding of this study indicate that ICT competency insignificantly affect performance expectancy and behavior intention relationship.

Referring to these empirical results, the study rejected H_9, H_{10} and H_{11}.

H_9: Gender positively moderate the relationship between performance expectancy and behavior intention.

H_{10}: Age positively moderate performance expectancy and behavior intention relationship

H_{11}: ICT competency positively moderate performance expectancy and behavior intention relationship

The factors gender, age, experience and ICT competency moderation analysis on effort expectancy and the behavior intention relationships. Firstly, the moderating affect of gender on effort expectancy and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and the p value greater than 0.05 two tailed. Refer to Table 5.7. The findings of this study consistent with the some researches (Al-Gahtani et al., 2007; Alshehri et al., 2013; Jaradat & Mamoun, 2013; Wang et al., 2009) yet on the other hand, contradicts with the following research's (Akbar, 2013; Viswanath Venkatesh et al., 2003). The insignificant affect of gender towards effort expectancy and behavioral intention could be there is no different between male and female, both of them believes the ease of use will encourage them to use ICT.

Secondly, the moderating affect of age on effort expectancy and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and the p value greater than 0.05 two tailed. Refer to Table 5.7. This result confirmed by the following researches (Jaradat & Mamoun, 2013; Wang et al., 2009; Yu, 2012). Contrariwise, the following researches inconsistent with the research result (Ghalandari, 2012b; Venkatesh et al., 2003). The reason could be most of the student's in all age categories believe that the ease of use of computer will encourage them to use ICT and learn it. So there is no different by age.

Thirdly, the moderating affect of experience on effort expectancy and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and the p value greater than 0.05 two tailed (refer to Table 5.7). This result inconsistent with the following research's (Alshehri et al., 2013; Venkatesh et al., 2003). This research confirmed

findings of (Al-Gahtani et al., 2007). However, there are lack of studies confirmed the present research result, most of the previous studies excluded the moderating variables from the research model. So the reason behind the experience insignificant affect on effort expectancy and behavior intention for experienced students normally are not influenced by computers ease of use.

Finally, the moderating affect of ICT competency on effort expectancy and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t value is less than 1.96 and the p-value greater than 0.05 two tailed, refer to Table 5.7. Although, the importance of the ICT competency on the student ICT skills (Ahmad et al., 2011). But is not used as a moderator in the previous studies. However, the study by Hana (2011) mentioned that the competent person is more likely to perform a job better with less effort than an incompetent person. So the present study assumed that ICT competency could moderator the relation between effort expectancy and behavior intention. But the finding of the study indicate that ICT competency insignificantly affect on effort expectancy and behavior intention relationship. It could be when the system ease to use, so will not affect even if the student competent or not.

According the above empirical results, this study does reject the following hypothesis H_{13}, H_{14}, H_{15}, and H_{16}.

H_{13}: Gender positively moderate the relationship between effort expectancy and behavior intention.

H_{14}: Age positively moderate the relationship between effort expectancy and behavior intention.

H_{15}: Experience positively moderate the relationship between effort expectancy and behavior intention.

H_{16}: ICT competency positively moderate the relationship between effort expectancy and behavior intention.

The gender, age, experience, voluntary of use, and ICT competency moderation analysis on social influence and the behavior intention relationship. Firstly, the moderating affect of gender on social influence and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p value greater than 0.05 two tailed. Refer to Table 5.7. The finding of this study confirmed by (Al-Gahtani et al., 2007; Jaradat & Mamoun, 2013). While the following studies contradicts with the research findings (Schmidt, 2012; Venkatesh et al., 2003). It could be same reason with the direct affect of social influence, the students consider it personal choice for both male or female, so the social influence and it is moderators were insignificant.

Secondly, the moderating affect of age on social influence and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p value greater than 0.05 two tailed, refer to Table 5.7. The findings confirmed by the following research's (Jaradat & Mamoun, 2013; Toh, 2013). Contrariwise, the findings were not consistent with the works of (Ghalandari, 2012; Venkatesh et al., 2003). The reason behind of the insignificant affect, it could be that most of the studies in same age, and all of them believes using ICT it is personal issue, they are confident of them self and they are not listening to other opinion.

Thirdly, the moderating affect of experience on social influence and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p-value greater than 0.05 two tailed, refer to Table 5.7. The findings verified by the following studies (Al-Gahtani et al., 2007). While there are many previous studies inconsistent with the findings, such as (Ghalandari, 2012; Venkatesh et al., 2003). The findings indicate that both high experiences students and less experiences students believes that other opinions will not affect them to use or learn ICT skills.

Fourthly, the moderating affect of voluntary of use on social influence and behavior intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p- value greater than 0.05 two tailed, refer to Table 5.7. Most of the previous studies eliminated voluntary of use from their studies, in this study, the researcher used it as moderator for social influence. The insignificant affect of voluntary of use it could be that students believes whether to learn ICT or not, it is optional for them, not mandatory. So the voluntary does not have any affect on the social.

Finally, the moderating affect of ICT competency on social influence and behavioral intention relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p- value greater than 0.05 two tailed, refer to Table 5.7. Even though lack of studies used ICT competency as moderator, ICT competency has vital affect to the ICT skills (Pullen, 2015). So the researcher believes this factor could moderate the relation between social influence and behavior intention. According to the finding, the result indicate that ICT competency insignificantly affect social influence and behavior intention relationship. So

the insignificant affect of ICT competency could be the students believe nothing to do with social influence.

Referring to the empirical results, the study rejected the following hypothesis H_{18}, H_{19}, H_{20}, H_{21}, and H_{22}.

H_{18}: Gender positively moderate the relationship between social influence and behavior intention.

H_{19}: Age positively moderate the relationship between social influence and behavior intention.

H_{20}: Experience positively moderate the relationship between social influence and behavior intention.

H_{21}: Voluntary of use positively moderate the relationship between social influence and behavior intention.

H_{22}: ICT competency positively moderate the relationship between social influence and behavior intention.

The moderation analysis of age and experience on facilitating conditions and the behavior use relationship. Firstly, the moderating affect of age on facilitating conditions and behavioral use relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t- value is less than 1.96 and the p-value greater than 0.05 two tailed. refer to Table 5.7. there are few studies confirmed the findings, such as (Al-Gahtani et al., 2007). The findings of this research ware inconsistent with some studies with the findings (Venkatesh et al., 2003; Yu, 2012) possibility of insignificant findings due to most of the students with same age.

Secondly, the moderating affect of experience on facilitating conditions and behavioral use relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p-value greater than 0.05 two tailed, refer to Table 5.7. the findings of this study confirmed by (Jaradat & Mamoun, 2013). There is lack of studies confirmed the findings because most of the previous studies not considered the moderator variables, such as (Wang et al., 2006). The insignificant moderating affect of experience on the facilitating conditions probably means the more experienced students get to learn ICT, the less availability of facilities and support in their environments.

Finally, the moderating affect of ICT competency on facilitating conditions and behavior use relationship was insignificant. The relationship is insignificant at the ninety-five percent (95%) significant level because the t-value is less than 1.96 and the p- value greater than 0.05 two tailed, refer to Table 5.7. Despite the fact that previous studies haven't used ICT competency as moderator. However, ICT competency has spirited affect on the ICT skills (Pullen, 2015). So this research assumed this factor able to moderate the facilitating conditions and behavior use relationship. Based on those empirical results, the study rejected the following hypothesis H_{24} and H_{25}

H_{24}: Age positively moderate the relationship between facilitating condition and the behavior use of ICT.

H_{25}: Experience positively moderate the relationship between facilitating condition and the behavior use of ICT.

Table 5.8: Hypothesis testing

Hypothesis	Result	Hypothesis	Result	Hypothesis	Result
H_1	**Accepted**	H_{10}	Rejected	H_{19}	Rejected
H_2	Rejected	H_{11}	Rejected	H_{20}	Rejected
H_3	**Accepted**	H_{12}	**Accepted**	H_{21}	Rejected
H_4	Rejected	H_{13}	Rejected	H_{22}	Rejected
H_5	Rejected	H_{14}	Rejected	H_{23}	**Accepted**
H_6	Rejected	H_{15}	Rejected	H_{24}	Rejected
H_7	Rejected	H_{16}	Rejected	H_{25}	Rejected
H_8	Rejected	H_{17}	Rejected	H_{26}	**Accepted**
H_9	Rejected	H_{18}	Rejected		

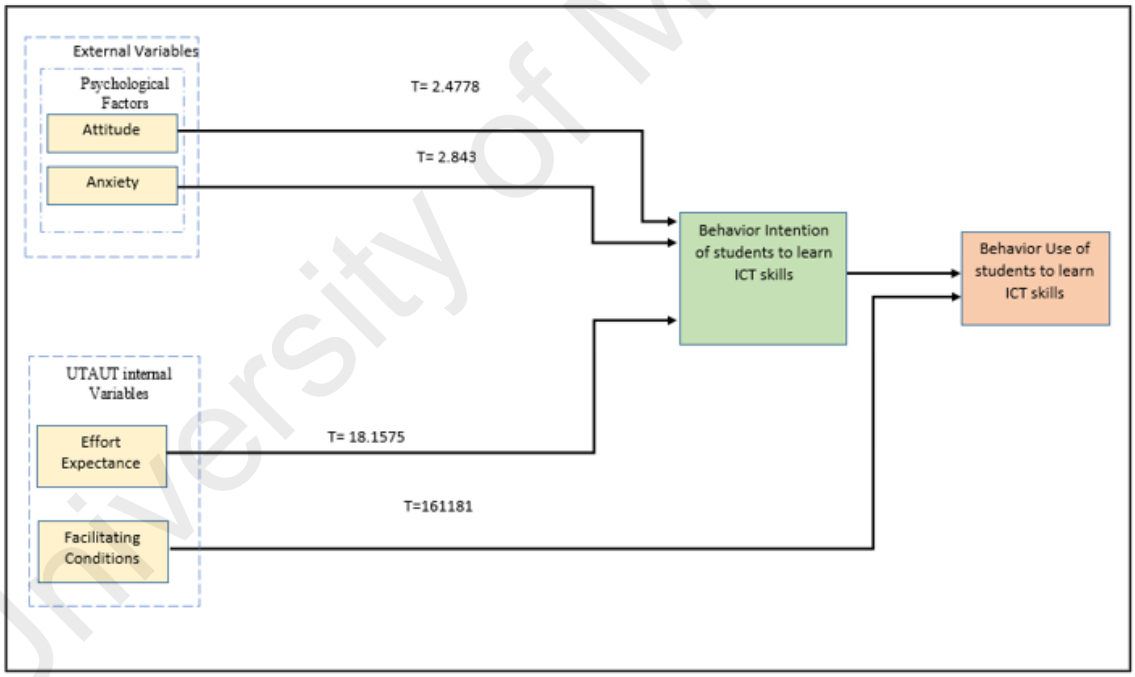

Figure 5.4: Research Model

The finding showed that students ICT skills was affected by attitude, anxiety effort expectancy and facilitating conditions, figure 5.4 clearly illustrate the relation between these variables and behavior intention and behavior use of the students to learn ICT skills.

5.7 Chapter Summary

This chapter begun with the data preparation and data cleaning. The regression analysis done using PLS-SEM of the outer measurement model and inner structural model of the extended UTAUT with required validity and reliability checked. Moderation analysis done to understand under constructs of the extended UTAUT model operate. Chapter Six explained the results and findings of this research.

CHAPTER 6: DISCUSSING AND CONCLUSION

6.1 Introduction

This chapter start with summary presentation of the research findings followed by the discussing, development of the findings conclusions and research recommendations to enhance the framework as well as recommendations for future research.

The research aim of this was to develop a model identifying the factors affecting students' ICT skills. To achieve the aim of this study, a conceptual framework was proposed as shown in Figure 2.7 based on the reviews of the literatures done. A survey was then developed and the questionnaires are as shown in Appendix A and used to gather data as discussed in Chapter 3 and analyzed as shown in Chapter 4. To investigate the student's perceptions regarding the proposed influence factors on the on the student's ICT skills Partial least squares (PLS) was used and was discussed in Chapter 5. The findings from the survey data indicated the framework and confirmed the factors that affecting student's ICT skills. Also discussion of the research findings of the study were done and linking these findings with prior researches. Summation findings of the research, conclusions, and research limitations were made in this current chapter.

6.2 Discussion

ICT skills covers skills of computer hardware and software skills including communication ability, applications systems and new IT technology. ICT skills enabled better job employability with better remunerations, improving decision making and enhancing quality life.

Critical literature reviews help to analysis research gap for the research purpose in identifying factors affecting HEIs student's ICT skills. A thorough exhaustive search of

appropriate and relevant literatures highlighted minimal researches done relating to ICT skills despite many researches has been done on various field of ICT. Some researchers such as Akçayır (2014) and Fong (2014) have studied ICT but these researches did not offer any theory or model development. This research put forward a model of predicting factors affecting students' ICT skill based on the UTAUT constructs.

The framework graphical representation formulated using path diagram where relationship of the variables factors is shown. Evaluation of the proposed framework was done using structural equation modelling (PLS-SEM) to determine correctness of the collected data from the respondents consisting of 504 undergraduate students of Malaysian universities.

This research ambitions at answering questions which factors were affecting the students' ICT skill. It is hope that the findings of this research is able to provide a comprehension on ICT skills and use pattern among the students.

6.3 Findings

In answering objective 1 and objective 2 to identify the factors affecting the students' ICT skills and to determine the impact of these factors students' ICT skills, the following findings were observed. The affect of attitude on the behavior intention of students was found to be significant which indicated that the reaction of students to learn ICT skills is positive. Attitude to learn ICT refers to student's level of ICT use preference and their perceptions about using ICT. Hence, attitude has been found to be a predictor of student's behavior intention to learn ICT skills. The moderating analysis of ICT competency on the attitude was found to be insignificant. The reason could be that the students believed that even if they were good in the ICT competency, it does not affect their attitude to learn more ICT skills.

The affect of anxiety on the behavior intention of students to use ICT were found to be significant. The results could suggest that the students' fear of harming the computers and doubt of learning computers use and low confidence level toward computers or maybe these students felt stressed when they were using the computer. The analysis on moderating factors of ICT competency on the anxiety was found to be insignificant. The contrasted finding with the previous studies owed to the fact that the students were very worried to use and learn ICT skills, especially for non-IT students where they considered ICT as new to them.

The affect of self-efficacy on the behavior intention of students to learn ICT was also found to be insignificant. The insignificant affect of self-efficacy indicates that nowadays students have the confidence to use ICT devices such as computers and mobiles due to the mass availability of the devices. The analysis of moderating factors of ICT competency on the self-efficacy found to be insignificant and the reason could be the students believed that nothing affects their confidence to learn ICT skills and with this confidence they were able to learn more and be skillful.

The relationship between availability of time and the behavior intention of students to learn ICT skills was found to be insignificant indicating that most of the students have not had enough time to learn ICT skills so the time could have considered is really prevent them to learn ICT.

The relationship between performance expectancy and the behavior intention of students to learn ICT skills was insignificant. In this research the performance expectancy defined as the belief degree that learning ICT skills help for job performance improvement. The insignificant affect of performance on the behavior intention could be because most of the respondent students do not have any job yet or unemployed. The analysis gender, age and ICT competency of the moderating factors on the performance

expectancy were found to be insignificant. It could be same reason with the direct affect of performance expectancy where most of the students were unemployment yet. Hence, since the main variable was rejected then all the moderator to that variable were rejected too.

However, the most significant affect on the behavior intention of students to learn ICT was their effort expectancy possibly illustrating that the ease of use is more important for students to learn ICT skills. The acquisition of high skilled students should support ease of use and the behavioral intention of students to learn ICT. The analysis on the moderating factors of gender, age, experience and ICT competency showed insignificant affect on effort expectancy and behavior intention relationship to learn ICT skills. This reason for this insignificant affect of gender indicating that there is a possibility that there was no difference between gender whether it was male and female as both of them believed that ease of use will encourage them to use ICT. The insignificant affect of age on effort expectancy and behavior intention relationship possibility indicating that most of the students were of same age where approximate 88% of the students were in the same age category. The insignificant moderating affect of experience on the effort expectancy probably meant that students with many years of experience or students having less years of experience believed that ease of use will encourage them to use ICT. Finally, the moderating of the ICT competency showed insignificant affect on effort expectancy and behavior intention relationship. This is because when the system is found to be of ease to use it does not affect if the students were competent or not.

The affect of social influences on the behavior intention of students to learn ICT skills was found to be insignificant. This may reflect to the fact that the students need to be independent to learn ICT skills so personal preference regarding effort or social variables may have less weight compared to an individual technology choice decision suggesting

that learning ICT skills tends to be a more personal matter. In addition, the students did not pay much attention for the opinions of other people who might be important for them (e.g. their lecturers or their peers). The gender, age, experience, voluntary of use and ICT competency analysis of the moderating factors on the social influence were found to be insignificant indicating that the students believed that learning ICT skill had no relationship with social influence.

The strongest and most significant direct affect on the students' intention was facilitating conditions affect use and to learn ICT skills. Facilitating condition is the extend of beliefs there exists support of organizational and technical infrastructure for ICT use. This indicated that with a higher support in terms of using information technology the students would be more likely to learn ICT skills. This finding indicated the significant of facilitating conditions having a conducive environment for the students. The students would be more likely to use and learn ICT when the technical infrastructure offers support to their use of ICT. The analysis of the moderation factors of age and experience showed insignificant affect on facilitating conditions and behavior use of student's relationship to learn ICT skills possibility because many of the students were of same age. The insignificant moderating affect of experience on the facilitating conditions probably meant that the more experienced students did not need as much facilities and support to learn ICT.

6.3.1 Theoretical implications

This research has extensively extended, elaborated and validated the Unified Theory of Acceptance and Use of Technology (UTAUT) applicability to determine, predict and understand the factors affecting students to learn ICT skills. It is considered as a successful key factor of the extension and elaboration of the UTAUT in the present research. Hence, the examined factors indeed contributed significantly to provide in-

depth understanding of how these factors were influenced the students' ICT skills. The analysis is useful as a baseline reference for the factors affecting ICT skills. Can also be used as a reference for academic purposes in order to fill the gap in existing ICT affecting factors.

6.3.2 Practical implications

This research also offers to provide some baseline knowledge to this issue so that universities can use the information to create a practical and useful methods to enhance students' teaching and learning ICT within the curriculum.

This research has focused on the following objectives:

1- To identify the factors affecting the students' ICT skills.
2- To determine the impact of these factors students' ICT skills.
3- To develop a framework based on the factors that affect students' ICT skills identified earlier.

Survey questionnaires were used as data collection instrument with research frame 504 students. The respondents were undergraduate students from various universities in Malaysia.

The plausibility of the theoretical model data fit done using statistical procedure, PLS-SEM in estimating degree of relationship to explain the variables affecting students' ICT skills. A computer software Smart (PLS-SEM) was used as appropriate technique for data analysis able to generate providing comprehensive explanations to establish variables interrelationship establishments. Some of the variables in the proposed framework were rejected based on the rejection of the hypothesis during testing due to the insignificant effect. The following section summarize the findings of the research.

6.4 Conclusion

HEIs understood the need of ICT skills within the students as among the important developmental tools that are making appearances in all aspects of economic, cultural and social realms. ICT becoming important skills to the ever-increasing global acceptance educational needs. In this regard, this research had identified the factors affecting the students' ICT skills, determined the impact of these factors students' ICT skills and developed a framework based on the factors that affect students' ICT skills identified.

This data collection process was done in various universities in Malaysian with 504 undergraduates as the research respondents. Survey was used as the research instrument to collect data. The findings of this research indicated three factors, namely anxiety, attitude and effort expectancy, having direct affect on the student's behavior intention to use ICT. Furthermore, facilitating conditions, and behavioral intention were also found to have direct affect on the behavior use of students to learn ICT skills. The framework coefficient of determination (R2) showed substantial value in the attempt to measure the explained variance of the latent variables. The moderating affect were found not have any significant affect to all the factors. Further, this research anticipated ICT skills acceptance of in different environment conditions (industrial, financial and educational sectors) requires eminence contextualized moderators.

The final objective of this research was the development of a framework based on the UTAUT constructs indicating factors affecting students' ICT skills. Based on the framework, the factors affecting students' ICT skills had a total variables clarify 79 percent of the dependent variables variances that needed focus to enhance the students' ICT skills. Proper education embedding the use of modern ICT help to motivate the students to increase their ICT skills. In addition, support in terms of resources like competent staffs and conducive environment help to motivate the students to learn ICT.

6.5 Meeting the Research Objectives

This section revisits the achievement of the research objectives outlined in Section 1.5 of Chapter One as:

1- To identify the factors affecting the students' ICT skills.

2- To determine the impact of these factors students' ICT skills.

3- To develop a framework based on the factors that affect students' ICT skills identified earlier.

To meet these objectives, three research questions were considered. The research questions were addressed previously in Section 1.6. Table 6.1 summarizes the mapping among the objectives, research questions, and achievement sections.

Table 6.1: Mapping between Objectives, Research Questions and Achievement Sections

Objectives	Research Questions	References	
		Chapters	Sections
Objective 1	I. What are the factors affecting the students' ICT skills?	2	2.2
		2	2.3
		2	2.4
		2	2.5
Objective 2	II. What impact has these factors and their moderating variables on the students' ICT skills?	5	5.5
		5	5.6
Objective 3	III. How would the model be developed based on the identified factors?	5	5.5.7
		5	5.5.8

6.6 Limitation and Future Work

This research limitation is reflected in the research methodology and data analysis. First, this research presented representative of local sample collected in one single country. Next, this respondent of this study were undergraduate students in Malaysian

universities where findings generalizations are made difficult. As such, data collections need to be done on other groups of students so generalization of the findings can be made. Thirdly, this study used a survey technique only as data collection method. Fourthly, explanations of factors of only 0.793 of the variance in intention and 0.662 in use of ICT skills indicating presence of other variance factors in understanding factors affecting students' ICT skills. Fifthly, this study used only Structural Equation Modeling (PLS-SEM) to determine the influential factors of ICT skills.

Even though this research has the undeniable merit of offering valuable insights into the higher education institutes it also had some limitations. The study investigated participants who were undergraduate student. The generalization of the results to other populations with different educational level may be limited. As for the future research it is hereby proposed that studies should be made more general and to be conducted globally. Thus, more replications can be done to test the framework proposed in this research and comparative of these studies would surely be interesting and more knowledge insight could be discovered.

6.7 Recommendations

Several recommendations are presented for future research in relation to predicting factors affecting students' ICT skills as suggested in the findings of this research.

6.7.1 Recommendation for Future Research

This study investigated the factors affecting the students' ICT skills. However, there may be possibly some questions remained unanswered as one study might be difficult to address all issues. Further future study need to be taken up if these questions demand to be answered. Listed below are some future studies recommendations reflected by the limitations of this research.

Firstly, the need for different categories of students geographically spread. The respondents of this study were undergraduate students in Malaysian universities, hence a further study need to be done using a more comprehensive sample of students in different countries and different levels of programs including the postgraduate's students.

Secondly, using different investigations methods to analyze data such as hierarchical multiple regression. This study used only Structural Equation Modeling (PLS-SEM) to determine the most important factors affecting the student's ICT skills.

Next, there could possibly other unearth factors affecting ICT skills. In this study only 0.793 of variance in intention and 0.662 of variance in use of ICT skills was explained by proposed factors. It seems that there were other additional variables that were important in explaining students' intention and use of ICT skills that have not been considered in this study, therefore further research is necessary.

Finally, proposed to use qualitative research methodology to examine the affecting factors on students' ICT skills. This research was a quantitative; hence, it would be interesting for future research to be done using qualitative research methodology.

6.7.2 Recommendations for Practice

The outcome of this research finding can be important feedback can recommendation for HEIs in providing good ICT skill development program for undergraduate to have better job employment value candidate for the market and industries. Factors that also need to be considered include increasing the availability of necessary resources including competent and knowledge staffs, hardware and facilitates, ease of use, the confidence of students and having the correct attitude. The findings managed to provide insights about the factors affecting the student's ICT skills and into the motivations underlying the behavior intentions and behavioral use of students.

REFERENCES

Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. The International Review of Research in Open and Distributed Learning, 14(5).

Achampong, E. K. (2012a). Gender difference in information and communication technology use among university students. J. Inform. Technol. Appl. Edu., 1(4), 207-210.

Achampong, E. K. (2012b). Gender Difference in Information and Communication Technology Use among University Students.

Aesaert, K., & van Braak, J. (2014). Exploring factors related to primary school pupils' ICT self-efficacy: A multilevel approach. Computers in Human Behavior, 41, 327-341.

Aesaert, K., & van Braak, J. (2015). Gender and socioeconomic related differences in performance based ICT competences. Computers & Education, 84, 8-25.

Aesaert, K., van Braak, J., Van Nijlen, D., & Vanderlinde, R. (2015). Primary school pupils' ICT competences: Extensive model and scale development. Computers & Education, 81, 326-344.

Afthanorhan, W. M. A. B. W. (2014). Hierarchical component using reflective-formative measurement model in partial least square structural equation modeling (PLS-SEM). International Journal of Mathematics and Statistics Invention (IJMSI), 2 (2), 55, 71.

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. MIS quarterly, 665-694.

Agbatogun, A. O. (2010). Self-concept, computer anxiety, gender and attitude towards interactive computer technologies: A predictive study among Nigerian teachers. International Journal of Education and Development using Information and Communication Technology, 6(2), 1D.

Agudo-Peregrina, Á. F., Hernández-García, Á., & Pascual-Miguel, F. J. (2014). Behavioral intention, use behavior and the acceptance of electronic learning systems: Differences between higher education and lifelong learning. Computers in Human Behavior, 34, 301-314.

Ahmad, Ibrahim, H., & Yusof, S. A. M. (2010). Factors in designing computer based distance training system for public sector employees.

Ahmad, M. I. (2014). Unified Theory of Acceptance and Use of Technology (UTAUT).

Ahmad, M. O., Markkula, J., & Oivo, M. (2012). Factors influencing the adoption of e-government services in Pakistan. Paper presented at the Proceedings of the 9th European, Mediterranean & Middle Eastern Conference on Information Systems.

Ahmad, T., Ibrahim, H., & Yusof, S. A. M. (2010). Factors in designing computer based distance training system for public sector employees.

Ahmad, T., Ibrahim, H., & Yusof, S. A. M. (2011). Factors in designing computer based distance training system for public sector employees.

Ahmad, T., Ibrahim, H., & Yusof, S. A. M. (2014). Issues and Challenges in Applying Computer-Based Distance Learning system as an alternative to traditional training methods. Journal on Computing (JoC), 1(2).

Ajzen, I. (1988). Attitudes and personality traits. Attitudes, personality and behavior, 1-24.

Ajzen, I., & Fishbein, M. (1975). Belief, attitude, intention and behavior: An introduction to theory and research: Reading, MA: Addison-Wesley.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social. Behaviour. Englewood Cliffs, NJ: Prentice-Hall.

Akarawang, C., Kidrakran, P., & Nungchalerm, P. (2016). Developing ICT competency for Thai teachers through blended training. Journal of Education and Learning (EduLearn), 10(1), 15-21.

Akbar, F. (2013). What affects students' acceptance and use of technology?

Akpan, C., & Ita, A. (2015). Teacher professional development and quality universal basic education in lagos state, nigeria.

Al-Gahtani, S. S. (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. Applied Computing and Informatics, 12(1), 27-50.

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. Information & Management, 44(8), 681-691.

Al-Haderi, S. (2013). The effect of self-efficacy in the acceptance of information technology in the public sector. International Journal of Business and Social Science, 4(9), 188-198.

Al-Shafi, S., & Weerakkody, V. (2010). Factors affecting e-government adoption in the state of Qatar.

Al, T., & Al, G. K. (2016). A case study in developing the ICT skills for a group of mixed abilities and mixed aged learners at ITEP in Dubai-UAE and possible future RFID implementations Envisioning the Future of Online Learning (pp. 133-146): Springer.

AlAwadhi, S., & Morris, A. (2008). The Use of the UTAUT Model in the Adoption of E-government Services in Kuwait. Paper presented at the Hawaii International Conference on System Sciences, Proceedings of the 41st Annual.

Ali. (2006). Research methods in psychology and educational science. Tehran: PNU publications.

Ali, F., Nair, P. K., & Hussain, K. (2016). An assessment of students' acceptance and usage of computer supported collaborative classrooms in hospitality and tourism schools. Journal of Hospitality, Leisure, Sport & Tourism Education, 18, 51-60.

Allahyari, A., & Ramazani, M. (2012). Studying Impact of Organizational Factors in Information Technology Acceptance in Accounting Occupation by Use of TAM Model (Iranian Case Study). ARPN Journal of Systems and Software, 2(1), 12-17.

Almahamid, S., & Rub, F. A. (2011). Factors that determine continuance intention to use e-learning system: an empirical investigation. Paper presented at the International conference on telecommunication technology and applications Proc. of CSIT.

Alrawashdeh, T. A., & Al-Mahadeen, B. M. (2013). Extended UTAUT to Examine the Acceptance of Web Based Training Systems by Public Sector Employees.

Alrawashdeh, T. A., Muhairat, M. I., & Alqatawnah, S. M. (2012). Factors affecting acceptance of web-based training system: Using extended UTAUT and structural equation modeling. arXiv preprint arXiv:1205.1904.

Alshehri, M., Drew, S., & AlGhamdi, R. (2013). Analysis of Citizens Acceptance for E-government Services: Applying the UTAUT Model. arXiv preprint arXiv:1304.3157.

Althunibat, A. (2015). Determining the factors influencing students' intention to use m-learning in Jordan higher education. Computers in Human Behavior, 52, 65-71.

Andreev, P., Heart, T., Maoz, H., & Pliskin, N. (2009). Validating formative partial least squares (PLS) models: methodological review and empirical illustration. ICIS 2009 Proceedings, 193.

Archibong, I. A., Ogbiji, J. E., & Anijaobi-Idem, F. (2010). ICT competence among academic staff in universities in Cross Rivers State, Nigeria. Computer and Information Science, 3(4), 109.

Arvanitis, S., & Loukis, E. N. (2009). Information and communication technologies, human capital, workplace organization and labour productivity: A comparative study based on firm-level data for Greece and Switzerland. Information Economics and Policy, 21(1), 43-61.

Atasoy, H. (2012). ICT Skills and Employment Opportunities.

Attuquayefio, S., & Addo, H. (2014). Review of studies with utaut as conceptual framework. European scientific journal, 10(8).

Aypay, A. (2010). Information and communication technology (ICT) usage and achivement of Turkish students in PISA 2006. TOJET: The Turkish Online Journal of Educational Technology, 9(2).

Badescu, M., & Garcés-Ayerbe, C. (2009). The impact of information technologies on firm productivity: Empirical evidence from Spain. Technovation, 29(2), 122-129.

Bakar, A. A., Razak, F. Z. A., & Abdullah, W. S. W. (2013). Assessing the effects of UTAUT and self-determination predictor on students continuance intention to use student portal. World Applied Sciences Journal, 21(10), 1484-1489.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory: Prentice-Hall, Inc.

Becker, J.-M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: guidelines for using reflective-formative type models. Long Range Planning, 45(5), 359-394.

Bello, H., Shu'aibu, B., bin Saud, M. S., & Buntat, Y. (2013). ICT Skills for Technical and Vocational Education Graduates' Employability. World Applied Sciences Journal, 23(2), 204-207.

Bennani, A.-E., & Oumlil, R. (2013). Factors fostering IT acceptance by nurses in Morocco: Short paper. Paper presented at the Research Challenges in Information Science (RCIS), 2013 IEEE Seventh International Conference on.

Bernard, H. R., & Bernard, H. R. (2012). Social research methods: Qualitative and quantitative approaches: Sage.

Bhatiasevi, V. (2015). An extended UTAUT model to explain the adoption of mobile banking. Information Development.

Blanco, M., & López Bóo, F. (2010). Ict skills and employment: A randomized experiment.

Borrero, J. D., Yousafzai, S. Y., Javed, U., & Page, K. L. (2014). Expressive participation in Internet social movements: Testing the moderating effect of technology readiness and sex on student SNS use. Computers in Human Behavior, 30, 39-49.

Botvinick, M., & Braver, T. (2015). Motivation and cognitive control: from behavior to neural mechanism. Annual Review of Psychology, 66, 83-113.

Brown, J. D. (2011). Likert items and scales of measurement. Shiken: JALT Testing & Evaluation SIG Newsletter, 15(1), 10-14.

Buarki, H. (2015). ICT skills evaluation of faculty members in Kuwait; Preliminary findings. Information Development.

Buarki, H., Hepworth, M., & Murray, I. (2011). ICT skills and employability needs at the LIS programme Kuwait: a literature review. New Library World, 112(11/12), 499-512.

Buarki, H., Hepworth, M., Murray, I., & McKnight, C. (2009). Educating library and information science professionals in Kuwaiti higher education. E-prints in Library and Information Science, 1-10.

Calitz, A. P., Greyling, J. H., & Cullen, M. D. (2014). South African industry ICT graduate skills requirements. Southern African Computer Lecturers' Association (SACLA), 1, 25-26.

Calzarossa, M. C., Ciancarini, P., Maresca, P., Mich, L., & Scarabottolo, N. (2007). The ECDL Programme in Italian Universities. Computers & Education, 49(2), 514-529.

Campisi, D., De Nicola, A., Farhadi, M., & Mancuso, P. (2013). Discovering the impact of ICT, FDI and human capital on GDP: a cross-sectional analysis. Int. J. Eng. Bus. Manag, 5, 46.

Castañeda, J. A., Muñoz-Leiva, F., & Luque, T. (2007). Web Acceptance Model (WAM): Moderating effects of user experience. Information & Management, 44(4), 384-396.

Cazan, A.-M., Cocoradă, E., & Maican, C. I. (2016). Computer anxiety and attitudes towards the computer and the internet with Romanian high-school and university students. Computers in Human Behavior, 55, 258-267.

Celik, V., & Yesilyurt, E. (2013). Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education. Computers & Education, 60(1), 148-158.

Cha, S. E., Jun, S. J., Kwon, D. Y., Kim, H. S., Kim, S. B., Kim, J. M., . . . Jun, W. C. (2011). Measuring achievement of ICT competency for students in Korea. Computers & Education, 56(4), 990-1002.

Chen, J.-L. (2011). The effects of education compatibility and technological expectancy on e-learning acceptance. Computers & Education, 57(2), 1501-1511.

CHENG, M., Park, J., & YUEN, A. H. (2014). The influence of school and home cultural factors on the educational use of information and communication technology: A case study in Hong Kong. Paper presented at the Proceedings of HKAECT2014 International Conference.

Chiemeke, S., & Evwiekpaefe, A. (2011). A conceptual framework of a modified unified theory of acceptance and use of technology (UTAUT) Model with Nigerian factors in E-commerce adoption. Educational Research, 2(12), 1719-1726.

Chiu, T. M., & Ku, B. P. (2015). Moderating effects of voluntariness on the actual use of electronic health records for allied health professionals. JMIR medical informatics, 3(1), e7.

Chuo, Y.-H., Tsai, C.-H., Lan, Y.-L., & Tsai, C.-S. (2011). The effect of organizational support, self-efficacy, and computer anxiety on the usage intention of e-learning system in hospital. African Journal of Business Management, 5(14), 5518-5523.

Cohen, L., & Manion, L. (2007). Research Method in Education (Revised Ed.): USA: Routledge.

Compeau, D. R., & Higgins, C. A. (1995a). Application of social cognitive theory to training for computer skills. Information systems research, 6(2), 118-143.

Compeau, D. R., & Higgins, C. A. (1995b). Computer self-efficacy: Development of a measure and initial test. MIS quarterly, 189-211.

Danner, R. B., & Pessu, C. O. (2013). A survey of ICT competencies among students in teacher preparation programmes at the University of Benin, Benin City, Nigeria. Journal of Information Technology Education, 12, 33-49.

Dasuki, S. I., & Abbott, P. (2015). A Socio-Technical Analysis of ICT Investments in Developing Countries: A Capability Perspective. The Electronic Journal of Information Systems in Developing Countries, 67(1), 1-29.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management science, 35(8), 982-1003.

Day, A., Scott, N., & Kelloway, E. K. (2010). Information and communication technology: Implications for job stress and employee well-being. New developments in theoretical and conceptual approaches to job stress, 8, 317-350.

De Wit, K., Heerwegh, D., & Verhoeven, J. C. (2012). Changes in the basic ICT skills of freshmen between 2005 and 2009: Who's catching up and who's still behind? Education and Information Technologies, 17(2), 205-231.

De Wit, K., Heerwegh, D., & Verhoeven, J. C. (2014). Can openness to ICT and scientific research predict the ICT skills and ICT use of bachelor's students? Computers & Education, 78, 397-413.

Debashish, M., & Robert, J. (2012). Extending Utaut to explain social media adoption by microbusinesses. International Journal of Managing Information Technology (IJMIT), 4(4).

Deng, S., Liu, Y., & Qi, Y. (2011). An empirical study on determinants of web based question-answer services adoption. Online Information Review, 35(5), 789-798.

Di Pietro, L., Mugion, R. G., Mattia, G., Renzi, M., & Toni, M. (2015). The integrated model on mobile payment acceptance (IMMPA): an empirical application to public transport. Transportation Research Part C: Emerging Technologies, 56, 463-479.

Dillman, D. (2007). The tailored design method: Mail and internet surveys . Hoboken: NJ: John Wiley & Sons, Inc.

Dillon, A. (2001). User acceptance of information technology. Encyclopedia of human factors and ergonomics.

Dillon, A., & Morris, M. G. (1996). User acceptance of new information technology: theories and models. Annual review of information science and technology.

Donaldson, R. L. (2010). Student acceptance of mobile learning: The Florida State University.

Dündar, H., & Akçayır, M. (2014). Implementing tablet PCs in schools: Students' attitudes and opinions. Computers in Human Behavior, 32, 40-46.

Dwivedi, Y. K., Rana, N. P., Chen, H., & Williams, M. D. (2011). A Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT) Governance and sustainability in information systems. Managing the transfer and diffusion of it (pp. 155-170): Springer.

Dwivedi, Y. K., Shareef, M. A., Simintiras, A. C., Lal, B., & Weerakkody, V. (2016). A generalised adoption model for services: A cross-country comparison of mobile health (m-health). Government Information Quarterly, 33(1), 174-187.

Edgar, L. D., Johnson, D. M., & Cox, C. (2012). A 10-year assessment of information and communication technology tasks required in undergraduate agriculture courses. Computers & Education, 59(2), 741-749.

Edmunds, R., Thorpe, M., & Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach. British journal of educational technology, 43(1), 71-84.

El Ouirdi, M., El Ouirdi, A., Segers, J., & Pais, I. (2016). Technology adoption in employee recruitment: The case of social media in Central and Eastern Europe. Computers in Human Behavior, 57, 240-249.

Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors that influence the perceived advantages and relevance of Facebook as a learning tool: An extension of the UTAUT. Australasian Journal of Educational Technology, 30(2).

Evangelista, P. (2017). Information and communication technologies: a key factor in freight transport and logistics Training in Logistics and the Freight Transport Industry (pp. 29-50): Routledge.

Fairlie, R. W. (2012). The effects of home access to technology on computer skills: Evidence from a field experiment. Information Economics and Policy, 24(3), 243-253.

Falck, O., Heimisch, A., & Wiederhold, S. (2016). Returns to ICT skills.

Fančovičová, J., & Prokop, P. (2008). Students' attitudes toward computer use in Slovakia. Eurasia Journal of Mathematics, Science & Technology Education, 4(3), 255-262.

Fernández-Sanz, L., Gómez-Pérez, J., & Castillo-Martínez, A. (2017). e-Skills Match: A framework for mapping and integrating the main skills, knowledge and

competence standards and models for ICT occupations. Computer Standards & Interfaces, 51, 30-42.

Fink, A., & Litwin, M. S. (1995). How to measure survey reliability and validity (Vol. 7): Sage.

Fong, L. L., Sidhu, G. K., & Fook, C. Y. (2014). Exploring 21st Century Skills among Postgraduates in Malaysia. Procedia-Social and Behavioral Sciences, 123, 130-138.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 39-50.

Gao, T., & Deng, Y. (2012). A study on users' acceptance behavior to mobile e-books application based on UTAUT model. Paper presented at the Software Engineering and Service Science (ICSESS), 2012 IEEE 3rd International Conference on.

Gareis, K., Husing, T., Birov, S., Bludova, I., Schulz, C., & Korte, W. B. (2014). E-skills for jobs in Europe: Measuring progress and moving ahead.

Ghalandari, K. (2012a). The effect of performance expectancy, effort expectancy, social influence and facilitating conditions on acceptance of e-banking services in Iran: The moderating role of age and fender. Middle East Journal of Scientific Research, 12(6), 801-807.

Ghalandari, K. (2012b). The Effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on Acceptance of E-Banking Services in Iran: the Moderating Role of Age and Gender. Middle-East Journal of Scientific Research, 12(6), 801-807.

Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J.-J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. Computers in Human Behavior, 68, 441-449.

Gilbert, A. D. (2015). An exploration of the use of and the attitudes toward technology in first-year instrumental music.

Gopinathan, S., & Raman, M. (2015). Ergonomic Quality, Playing a Role in Ensuring Work Life Balance among Malaysian ICT Workers. Procedia-Social and Behavioral Sciences, 211, 1210-1215.

Gombachika, H. S., & Khangamwa, G. (2012). ICT readiness and acceptance among TEVT students in University of Malawi. Campus-Wide Information Systems, 30(1), 35-43.

Götz, O., Liehr-Gobbers, K., & Krafft, M. (2010). Evaluation of structural equation models using the partial least squares (PLS) approach Handbook of partial least squares (pp. 691-711): Springer.

Gumus, S. (2013). Investigating the Factors Affecting Information and Communication Technology (ICT) Usage of Turkish Students in PISA 2009. Turkish Online Journal of Educational Technology-TOJET, 12(1), 102-107.

Gupta, B., Dasgupta, S., & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. The Journal of Strategic Information Systems, 17(2), 140-154.

Haenlein, M., & Kaplan, A. M. (2004). A beginner's guide to partial least squares analysis. Understanding statistics, 3(4), 283-297.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139-152.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Editorial-partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. Long Range Planning, 46(1-2), 1-12.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40(3), 414-433.

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). A primer on partial least squares structural equation modeling (PLS-SEM): Sage Publications.

Hakkarainen, K., Ilomäki, L., Lipponen, L., Muukkonen, H., Rahikainen, M., Tuominen, T., Lehtinen, E. (2000). Students' skills and practices of using ICT: Results of a national assessment in Finland. Computers & Education, 34(2), 103-117.

Harsono, L. D., & Suryana, L. A. (2014). Factors Affecting the Use Behavior of Social Media Using UTAUT2 Model". Paper presented at the Proceedings of the First Asia-Pasific Conference on Global Business, Economics, Finance and Social Sciences, Singapore.

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach: Guilford Press.

Ho Cheong, J., & Park, M.-C. (2005). Mobile internet acceptance in Korea. Internet research, 15(2), 125-140.

Hoque, R., & Sorwar, G. (2017). Understanding factors influencing the adoption of mHealth by the elderly: An extension of the UTAUT model. International Journal of Medical Informatics, 101, 75-84.

Horst. Stipp. (2018). Confirmatory vs Exploratory Data Analysis [WWW].

Hu, H.-f., Al-Gahtani, S. S., & Hu, P. J.-H. (2010). Examining Gender Effects in Technology Acceptance by Arabian Workers: A Survey Study. Paper presented at the PACIS.

Hui-Yi, H., Luh-Wang, W., & Hsiu-Chuan, T. (2010). Consumers' behavioral intentions of using cross-media book for E-learning. Paper presented at the Information Sciences and Interaction Sciences (ICIS), 2010 3rd International Conference on.

Hunsinger, D., & Smith, M. (2008). Factors that influence information systems undergraduates to pursue IT certification. Journal of Information Technology Education: Research, 7(1), 247-265.

Hussein, I., Mahmud, M., & Yeo, A. W. (2010). HCI practices in Malaysia: A reflection of ICT professionals' perspective. Paper presented at the Information Technology (ITSim), 2010 International Symposium in.

Hussein, R., Mohamed, N., Ahlan, A. R., Mahmud, M., & Aditiawarman, U. (2010). G2C adoption of e-government in Malaysia: Trust, perceived risk and political self-efficacy. International Journal of Electronic Government Research (IJEGR), 6(3), 57-72.

Icek, A. (1988). Attitudes, personality and behavior. Chicago: Dorsey.

Icek, A. (1991). The Theory of Planned Behavior, Organizational Behavior and Human Decision Processes, Vol. 50. University of Massachusetts, Amherst.

Im, I., Hong, S., & Kang, M. S. (2011). An international comparison of technology adoption: Testing the UTAUT model. Information & Management, 48(1), 1-8.

Isa, C. M. M., Saman, H. M., Nasir, S. R. M., Preece, C. N., & Rani, N. I. A. (2015). Using PLS-SEM Path Modeling to Determine Factors Influencing Performance of Malaysian Construction Firms in International Markets InCIEC 2014 (pp. 121-136): Springer.

Ismail, S. (2010). International students' acceptance on using social networking site to support learning activities. International Journal for the Advancement of Science & Arts, 1(2), 81-90.

Jara, I., Claro, M., Hinostroza, J. E., San Martín, E., Rodríguez, P., Cabello, T., . . . Labbé, C. (2015). Understanding factors related to Chilean students' digital skills: A mixed methods analysis. Computers & Education, 88, 387-398.

Jaradat, M.-I. R. M., & Al Rababaa, M. S. (2013). Assessing key factor that influence on the acceptance of mobile commerce based on modified UTAUT. International Journal of Business and Management, 8(23), p102.

Jegede, P. O. (2009). Age and ICT-related behaviours of higher education teachers in Nigeria. Issues in Informing Science and Information Technology, 6, 770-777.

Jimoyiannis, A., & Komis, V. (2007). Examining teachers' beliefs about ICT in education: Implications of a teacher preparation programme. Teacher development, 11(2), 149-173.

John, S. P. (2015). The Integration of Information Technology in Higher Education: A Study of Faculty's Attitude Towards its Adoption in the Teaching Process. Paper

presented at the XIV International Business and Economy Conference (IBEC) Bangkok, Thailand.

Jong, D., & Wang, T.-S. (2009). Student acceptance of web-based learning system. Paper presented at the Proceedings of the 2009 International Symposium on Web Information Systems and Applications (WISA'09).

Kante, M., Oboko, R., & Chepken, C. (2016). Factors affecting the use of ICTs on agricultural input information by farmers in developing countries. AIMS Agriculture and Food, 1(3), 315-329.

Karaali, D., Gumussoy, C. A., & Calisir, F. (2011). Factors affecting the intention to use a web-based learning system among blue-collar workers in the automotive industry. Computers in Human Behavior, 27(1), 343-354.

Karjaluoto, H., Riquelme, H. E., & Rios, R. E. (2010). The moderating effect of gender in the adoption of mobile banking. International Journal of bank marketing, 28(5), 328-341.

Karuri, J., Waiganjo, P., & Manya, A. (2013). Adoption of Health Information Systems by health workers in developing countries—Contextualizing UTAUT. Paper presented at the IST-Africa Conference and Exhibition (IST-Africa), 2013.

Kerlinger, F. N., & Lee, H. B. (1999). Foundations of behavioral research.

Khalil Moghaddam, B., & Khatoon-Abadi, A. (2013a). Factors affecting ICT adoption among rural users: A case study of ICT Center in Iran. Telecommunications Policy, 37(11), 1083-1094.

Khan, K. S., Kunz, R., Kleijnen, J., & Antes, G. (2003). Five steps to conducting a systematic review. Journal of the Royal Society of Medicine, 96(3), 118-121.

Khorasanizadeh, H., Honarpour, A., Park, M. S.-A., Parkkinen, J., & Parthiban, R. (2016). Adoption factors of cleaner production technology in a developing country: energy efficient lighting in Malaysia. Journal of Cleaner Production, 131, 97-106.

Kim, H.-S., Kil, H.-J., & Shin, A. (2014). An analysis of variables affecting the ICT literacy level of Korean elementary school students. Computers & Education, 77, 29-38.

Kitchenham, B., Brereton, O. P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering–a systematic literature review. Information and software technology, 51(1), 7-15.

Klimova, B., Simonova, I., Poulova, P., Truhlarova, Z., & Kuca, K. (2016). Older people and their attitude to the use of information and communication technologies–a review study with special focus on the Czech Republic (Older people and their attitude to ICT). Educational Gerontology, 42(5), 361-369.

Korobili, S., Togia, A., & Malliari, A. (2010). Computer anxiety and attitudes among undergraduate students in Greece. Computers in Human Behavior, 26(3), 399-405.

Kuo, F.-Y., Tseng, F.-C., Lin, C. I., & Tang, W.-H. (2013). Critical success factors for motivating and sustaining women's ICT learning. Computers & Education, 67, 208-218.

Kurfalı, M., Arifoğlu, A., Tokdemir, G., & Paçin, Y. (2017). Adoption of e-government services in Turkey. Computers in Human Behavior, 66, 168-178.

Kusumaningtyas, N., & Suwarto, D. H. (2015). ICT Adoption, Skill and Use Differences among Small and Medium Enterprises Managers Based on Demographic Factors. Procedia-Social and Behavioral Sciences, 169, 296-302.

Kwon, N., & Song, H. (2011). Personality traits, gender, and information competency among college students. Malaysian Journal of Library & Information Science, 16(1), 87-107.

Lakhal, S., & Khechine, H. (2016). Student intention to use desktop web-conferencing according to course delivery modes in higher education. The International Journal of Management Education, 14(2), 146-160.

Lakhal, S., Khechine, H., & Pascot, D. (2013). Student behavioural intentions to use desktop video conferencing in a distance course: integration of autonomy to the UTAUT model. Journal of Computing in Higher Education, 25(2), 93-121.

Lean, O. K., Zailani, S., Ramayah, T., & Fernando, Y. (2009). Factors influencing intention to use e-government services among citizens in Malaysia. International Journal of Information Management, 29(6), 458-475.

Lee, & Kim, B. G. (2009). Factors affecting the usage of intranet: A confirmatory study. Computers in Human Behavior, 25(1), 191-201.

Lee, M.-C. (2010). Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model. Computers & Education, 54(2), 506-516.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. Information & Management, 40(3), 191-204.

Leiter, M. P., & Durup, J. (1994). The discriminant validity of burnout and depression: A confirmatory factor analytic study. Anxiety, stress, and coping, 7(4), 357-373.

Li, L. (2010). A critical review of technology acceptance literature. Retrieved April, 19, 2011.

Lin, K.-Y., & Lu, H.-P. (2011). Why people use social networking sites: An empirical study integrating network externalities and motivation theory. Computers in Human Behavior, 27(3), 1152-1161.

Ling, L. W., Downe, A. G., Ahmad, W. F. W., & Lai, T. T. (2011). Determinants of computer usage among educators: A comparison between the UTAUT and TAM models. Paper presented at the National Postgraduate Conference (NPC), 2011.

LIVINGSTONE, M. J. (2015). Use of ICT in teaching physics: a case of secondary schools in kimilili district, bungoma county, Kenya. KENYATTA UNIVERSITY.

López-Bassols, V. (2002). ICT skills and employment.

Lu, J., & Hao, Q. (2014). What factors impact on primary school students' online engagement for learning and entertainment at home. Journal of Computers in Education, 1(2-3), 133-150.

Luan, W. S., & Teo, T. (2009). Investigating the technology acceptance among student teachers in Malaysia: An application of the Technology Acceptance Model (TAM). The Asia-Pacific Education Researcher, 18(2), 261-272.

Luse, A., Mennecke, B., & Triplett, J. (2013). The changing nature of user attitudes toward virtual world technology: A longitudinal study. Computers in Human Behavior, 29(3), 1122-1132.

Ma, Q., Chan, A. H., & Chen, K. (2016). Personal and other factors affecting acceptance of smartphone technology by older Chinese adults. Applied ergonomics, 54, 62-71.

Magsamen-Conrad, K., Upadhyaya, S., Joa, C. Y., & Dowd, J. (2015). Bridging the Divide: Using UTAUT to predict multigenerational tablet adoption practices. Computers in Human Behavior, 50, 186-196.

Mahenge, M. P., & Sanga, C. (2016). ICT for e-learning in three higher education institutions in Tanzania. Knowledge Management & E-Learning, 8(1), 200.

Maillet, É., Mathieu, L., & Sicotte, C. (2015). Modeling factors explaining the acceptance, actual use and satisfaction of nurses using an Electronic Patient Record in acute care settings: An extension of the UTAUT. International Journal of Medical Informatics, 84(1), 36-47.

Malavolta, I., Ruberto, S., Soru, T., & Terragni, V. (2015). End Users' Perception of Hybrid Mobile Apps in the Google Play Store. Paper presented at the Mobile Services (MS), 2015 IEEE International Conference on.

Mardikyan, S., Beşiroğlu, B., & Uzmaya, G. (2012). Behavioral intention towards the use of 3G technology. Communications of the IBIMA, 10.

Matotek, D. (2013). An Analysis of Acceptance of ECDL Certificate for Administrative Professions. Paper presented at the Central European Conference on Information and Intelligent Systems.

McMahon, J., Gardner, J., Gray, C., & Mulhern, G. (1999). Barriers to student computer usage: staff and student perceptions. Journal of Computer Assisted Learning, 15(4), 302-311.

Memon, A. H., Rahman, I. A., Aziz, A. A. A., & Abdullah, N. H. (2013). Using structural equation modelling to assess effects of construction resource related factors on cost overrun. World Applied Sciences Journal, 21, 06-15.

MICHAELSEN, J. (2007). Confirmatory vs Exploratory Data Analysis [WWW].

Mnaathr, S. H., Basha, A. D., Mohain, A. R., & Jamaludin, R. (2013). Investigating and Finding the Attitudes and Self Efficiency of Learners in Iraqi Higher Education by Using Portable Devices. International Journal of Engineering Research and Development, 6(12), 112-118.

Moghaddam, B. K., & Khatoon-Abadi, A. (2013b). Factors affecting ICT adoption among rural users: A case study of ICT Center in Iran. Telecommunications Policy, 37(11), 1083-1094.

Mohamad Nor, F. (2013). Malaysian teachers' perception of applying technology in the classroom.

Mokaya, S., & Njuguna, E. (2017). Adoption and use of information and communication technology (ICT) by small enterprises in Thika Town, Kenya.

Mondragon, A. E. C., Mondragon, C. E. C., & Coronado, E. S. (2017). ICT adoption in multimodal transport sites: Investigating institutional-related influences in international seaports terminals. Transportation Research Part A: Policy and Practice, 97, 69-88.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information systems research, 2(3), 192-222.

Moran, M. J. (2006). College student's acceptance of tablet personal computers: a modification of the unified theory of acceptance and use of technology model: ProQuest.

Moskal, B. M., & Leydens, J. A. (2000). Scoring rubric development: Validity and reliability. Practical assessment, research & evaluation, 7(10), 71-81.

Mozafari, P., & Wray, D. (2013). Iranian EFL Teachers' Perspectives on their Use of ICT in their Teaching Practices: A Multiple Case Study. Paper presented at the EC-TEL Doctoral Consortium.

Mura, G., & Diamantini, D. (2014). The Use and Perception of ICT Among Educators: The Italian Case. Procedia-Social and Behavioral Sciences, 141, 1228-1233.

Mursalin, M., & Al, J. (2012). Information system adoption and usage: Validating UTAUT model for Bangladeshi SMEs.

Nägle, S., & Schmidt, L. (2012). Computer acceptance of older adults. Work: A Journal of Prevention, Assessment and Rehabilitation, 41, 3541-3548.

Nassuora, A. B. (2012). Students acceptance of mobile learning for higher education in Saudi Arabia. American Academic & Scholarly Research Journal, 4(2), 24-30.

Ndinoshiho, J. M. (2010). The use of electronic information services by undergraduate nursing students at the University of Namibia's Northern Campus: A descriptive study. Information Development, 26(1), 57-65.

Neuman, W. L., & Kreuger, L. (2003). Social work research methods: Qualitative and quantitative approaches: Allyn and Bacon.

Ng, M. (2016). Factors influencing the consumer adoption of Facebook: A two-country study of youth markets. Computers in Human Behavior, 54, 491-500.

Nor, A. S. M., & Kasim, N. A. A. (2015). Blended Learning Web Tool Usage among Accounting Students: A Malaysian Perspective. Procedia Economics and Finance, 31, 170-185.

Oates, B. J. (2005). Researching information systems and computing: Sage.

Okoye, A. C. (2018). Ict skills required of business education graduates for effective entrepreneurship practice in anambra state. Nigerian Journal of Business Education (NIGJBED), 4(1).

Oluwatobi, O., & Yemisi, B. (2014). Influence of Information Technology Competence and Demographic Characteristics on Undergraduate Student's Perception of E-Portal.

Opoku, M. O., & Kuranchie, A. (2014). Understanding Student Attitude Towards Computer Education: A Survey of SHS in the Sunyani Municipality. Academic Journal of Interdisciplinary Studies, 3(1), 11.

Orbeil, S., Hodgldns, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. Personality and Social Psychology Bulletin, 23(9), 945-954.

Osakwe, J., Dlodlo, N., & Jere, N. (2016). Where learners' and teachers' perceptions on mobile learning meet: A case of Namibian secondary schools in the Khomas region. Technology in Society.

Parameswaran, S., Kishore, R., & Li, P. (2015). Within-study measurement invariance of the UTAUT instrument: An assessment with user technology engagement variables. Information & Management, 52(3), 317-336.

Pardamean, B., & Susanto, M. (2012). Assessing user acceptance toward blog technology using the UTAUT model. International journal of mathematics and computers in simulation, 1(6), 203-212.

Park, Gunn, F., Lee, Y., & Shim, S. (2015). Consumer acceptance of a revolutionary technology-driven product: The role of adoption in the industrial design development. Journal of Retailing and Consumer Services, 26, 115-124.

Park, & Kim. (2014). An integrated adoption model of mobile cloud services: exploration of key determinants and extension of technology acceptance model. Telematics and Informatics, 31(3), 376-385.

Peng, G. (2017). Do computer skills affect worker employment? An empirical study from CPS surveys. Computers in Human Behavior, 74, 26-34.

Peters, R. S. (2015). The concept of motivation: Routledge.

Peterson, R. A., & Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. Journal of Applied Psychology, 98(1), 194.

Player-Koro, C. (2012). Factors influencing teachers' use of ICT in education. Education Inquiry, 3(1).

Polites, G. L., Roberts, N., & Thatcher, J. (2012). Conceptualizing models using multidimensional constructs: a review and guidelines for their use. European Journal of Information Systems, 21(1), 22-48.

Pullen, D. (2015). The influence of the home learning environment on middle school students' use of ICT at school. Australian Educational Computing, 30(1).

Rahimi, M., & Yadollahi, S. (2011). Computer anxiety and ICT integration in English classes among Iranian EFL teachers. Procedia Computer Science, 3, 203-209.

Ramakrishnan, K., & Yasin, N. M. (2011a). Employment issues among Malaysian Information and Communication Technologies (ICT) graduates: A case study. African Journal of Business Management, 5(26), 10855.

Ramakrishnan, K., & Yasin, N. M. (2011b). Employment issues among Malaysian Information and Communication Technologies (ICT) graduates: A case study. African Journal of Business Management, 5(26), 855-861.

Raman, A., Don, Y., & Daud, Y. (2015). Usage of EduBlogs Among Malaysian Secondary School Students. Mediterranean Journal of Social Sciences, 6(5), 500.

Ramirez-Correa, P. E., Rondan-Cataluña, F. J., & Arenas-Gaitán, J. (2015). Predicting behavioral intention of mobile Internet usage. Telematics and Informatics, 32(4), 834-841.

Rasheed, j., & shiratuddin, n. (2009). The moderating effect of gender on behavioural intention to use iris authentication approach for public authentication among nigerian users of public terminals. Jurnal sistem teknik industri, 10(3).

Rasimah, C. M. Y., Ahmad, A., & Zaman, H. B. (2011). Evaluation of user acceptance of mixed reality technology. Australasian Journal of Educational Technology, 27(8), 1369-1387.

Recker, J. (2012). Research Methods Scientific Research in Information Systems (pp. 65-110): Springer.

Reeve, J. (2014). Understanding motivation and emotion: John Wiley & Sons.

Riaz, A., & Adnan, A. (2016). Acceptance of Tablet Apps for E-learning by Senior Users: A Test of Unified Theory of Acceptance and Use of Technology.

Ringle, C. M., Sarstedt, M., & Straub, D. (2012). A critical look at the use of PLS-SEM in MIS Quarterly. MIS Quarterly (MISQ), 36(1).

Rogers Everett, M. (1995). Diffusion of innovations. New York.

Rohatgi, A., Scherer, R., & Hatlevik, O. E. (2016). The role of ICT self-efficacy for students' ICT use and their achievement in a computer and information literacy test. Computers & Education, 102, 103-116.

Rouse, A., & Corbitt, B. (2008). There's SEM and" SEM": A critique of the use of PLS regression in information systems research. ACIS 2008 Proceedings, 81.

Sahadani, N., & Salleh, S. (2014). Investigating Students' Acceptance Of Tablet PC In Learning Science: An Application Of The Modified Technology Acceptance Model. EDULEARN14 Proceedings, 3203-3215.

Salamat, M. A., Hassan, S., & Muhammad, M. S. (2011). Electronic Participation in Malaysia. Journal of e-Government Studies and Best Practices, 11.

Salman, A., Salleh, M. A. M., Abdullah, M. Y. H., Mustaffa, N., Ahmad, A. L., Kee, C. P., & Saad, S. (2017). ICT acceptance among Malaysian urbanites: A study of additional variables in user acceptance of the new media. Geografia-Malaysian Journal of Society and Space, 10(6).

Sancaka, M. (2015). Analysis of Factors Affecting The Acceptance and Use of Kompas ePaper by Kompas Daily Newspaper readers using Unified Theory of Acceptance and Use of Technology (UTAUT) Framework. Jurnal Strategi Pemasaran, 2(2), 1-7.

Seena, S., & KG Pillai, S. (2014). A study of ICT skills among library professionals in the Kerala University Library System. Annals of Library and Information Studies (ALIS), 61(2), 132-141.

Sekaran, U. (2006). Research methods for business: A skill building approach: John Wiley & Sons.

Sekaran, U., & Bougie, R. (2011). Research method for business: A skill building approach: Taylor & Francis.

Sekran, U. (2000). Research methods for business: John Wiley & Sons Inc. New York.

Sharma, A. K., & Kumar, D. (2012). User Acceptance of Desktop Based Computer Software Using UTAUT Model and addition of New Moderators. International Journal of Computer Science & Engineering Technology, 509-515.

Sien, V. Y., Mui, G. Y., Tee, E. Y. J., & Singh, D. (2014). Perceptions of malaysian female school children towards higher education in information technology. Paper presented at the Proceedings of the 52nd ACM conference on Computers and people research.

Şimşek, Ö., Altun, E., & Ateş, A. (2010). Developing ICT skills of visually impaired learners. Procedia-Social and Behavioral Sciences, 2(2), 4655-4661.

Singh, P. P., & Sharma, N. (2011). Information & Communication Technology for Marketing.

Slade, E. L., Dwivedi, Y. K., Piercy, N. C., & Williams, M. D. (2015). Modeling Consumers' Adoption Intentions of Remote Mobile Payments in the United Kingdom: Extending UTAUT with Innovativeness, Risk, and Trust. Psychology & Marketing, 32(8), 860-873.

Slavin, R. E. (1992). Research methods in education: Allyn & Bacon.

Sparks, J. R., Katz, I. R., & Beile, P. M. (2016). Assessing Digital Information Literacy in Higher Education: A Review of Existing Frameworks and Assessments With Recommendations for Next-Generation Assessment. ETS Research Report Series, 2016(2), 1-33.

Squillacciotti, S. (2010). Prediction oriented classification in PLS path modeling Handbook of Partial Least Squares (pp. 219-233): Springer.

Sriwindono, H., & Yahya, S. (2012). Toward modeling the effects of cultural dimension on ICT acceptance in Indonesia. Procedia-Social and Behavioral Sciences, 65, 833-838.

Suki, N. M., & Ramayah, T. (2010). User acceptance of the e-government services in Malaysia: structural equation modelling approach. Interdisciplinary Journal of Information, Knowledge, and Management, 5(1), 395-413.

Suki, N. M., Ramayah, T., & Ly, K. K. (2012). Empirical investigation on factors influencing the behavioral intention to use Facebook. Universal Access in the Information Society, 11(2), 223-231.

Sumak, B., Polancic, G., & Hericko, M. (2010). An empirical study of virtual learning environment adoption using UTAUT. Paper presented at the Mobile, Hybrid, and On-Line Learning, 2010. ELML'10. Second International Conference on.

Šumak, B., & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre-and post-adopters. Computers in Human Behavior, 64, 602-620.

Sundaravej, T. (2010). Empirical validation of unified theory of acceptance and use of technology model. Journal of Global Information Technology Management, 13(1), 5-27.

Sung, Y.-T., Chang, K.-E., & Liu, T.-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. Computers & Education, 94, 252-275.

Taiwo, a. A., & downe, a. G. (2013). The theory of user acceptance and use of technology (utaut): a meta-analytic review of empirical FINDINGS. Journal of Theoretical & Applied Information Technology, 49(1).

Taleb, Z. (2012). Information and Communication Technology Skills Ranking in Secondary School Curriculum. Procedia-Social and Behavioral Sciences, 69, 1093-1101.

Tengtrakul, P., & Peha, J. M. (2013). Does ICT in schools affect residential adoption and adult utilization outside schools? Telecommunications Policy, 37(6), 540-562.

Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. Computers & Education, 57(4), 2432-2440.

Teo, T., & Beng Lee, C. (2010). Explaining the intention to use technology among student teachers: An application of the Theory of Planned Behavior (TPB). Campus-Wide Information Systems, 27(2), 60-67.

Terzis, V., & Economides, A. A. (2011). The acceptance and use of computer based assessment. Computers & Education, 56(4), 1032-1044.

Thatcher, J. B., Gundlach, M. J., McKnight, D. H., & Srite, M. (2007). Individual and human-assisted computer self efficacy: An empirical examination. Wirtschaftinformatik Proceedings 2007, 50.

Toh, C. H. (2013). Assessing adoption of wikis in a Singapore secondary school: Using the UTAUT model. Paper presented at the Educational Media (ICEM), 2013 IEEE 63rd Annual Conference International Council for.

Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., & Edirisinghe, S. (2016). Responding to Challenges in Teacher Professional Development for ICT-Integration in Education. Educational Technology & Society, 19(3), 110-120.

Tondeur, J., Van Braak, J., & Valcke, M. (2007). Curricula and the use of ICT in education: Two worlds apart? British journal of educational technology, 38(6), 962-976.

Tondeur, J., Van de Velde, S., Vermeersch, H., & Van Houtte, M. (2016). Gender Differences in the ICT Profile of University Students: A Quantitative Analysis'. journal of diversity and gender studies.

Tsourela, M., & Roumeliotis, M. (2015). The moderating role of technology readiness, gender, and sex in consumer acceptance and actual use of Technology-based services. The Journal of High Technology Management Research, 26(2), 124-136.

Umar, I. N., & Hassan, A. S. A. (2015). Malaysian Teachers' Levels of ICT Integration and Its Perceived Impact on Teaching and Learning. Procedia-Social and Behavioral Sciences, 197.

Umar, I. N., & Hussin, F. K. (2014). ICT coordinators' perceptions on ICT practices, barriers and its future in Malaysian secondary schools: Correlation Analysis. Procedia-Social and Behavioral Sciences, 116, 2469-2473.

Unwin, T. (2009). ICT4D: Information and communication technology for development: Cambridge University Press.

Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. Journal of Information Technology Theory and Application, 11(2), 5-40.

van Deursen, A. J., van Dijk, J. A., & Peters, O. (2011). Rethinking Internet skills: the contribution of gender, age, education, Internet experience, and hours online to medium-and content-related Internet skills. Poetics, 39(2), 125-144.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management science, 46(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS quarterly, 36(1), 157-178.

Verhoeven, J. C., Heerwegh, D., & De Wit, K. (2010). Information and communication technologies in the life of university freshmen: An analysis of change. Computers & Education, 55(1), 53-66.

Verhoeven, J. C., Heerwegh, D., & De Wit, K. (2014). ICT learning experience and research orientation as predictors of ICT skills and the ICT use of university students. Education and Information Technologies, 1-33.

Verhoeven, J. C., Heerwegh, D., & De Wit, K. (2016). ICT learning experience and research orientation as predictors of ICT skills and the ICT use of university students. Education and Information Technologies, 21(1), 71-103.

Vitanova, V., Atanasova-Pachemska, T., Iliev, D., & Pachemska, S. (2015). Factors affecting the development of ICT competencies of teachers in primary schools. Procedia-Social and Behavioral Sciences, 191, 1087-1094.

Voutinioti, A. (2013). Determinants of User Adoption of e-Government Services in Greece and the Role of Citizen Service Centres. Procedia Technology, 8, 238-244.

Vu, K. M. (2011). ICT as a source of economic growth in the information age: Empirical evidence from the 1996–2005 period. Telecommunications Policy, 35(4), 357-372.

Wang, Hsiu-Yuan, Wang, & Shwu-Huey. (2010). User acceptance of mobile internet based on the unified theory of acceptance and use of technology: Investigating the determinants and gender differences. Social Behavior and Personality: an international journal, 38(3), 415-426.

Wang, Wu, & Wang. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. British journal of educational technology, 40(1), 92-118.

Wang, Y.-S., Hung, Y.-H., & Chou, S. (2006). Acceptance of E-Government service: A validation of the UTAUT. Paper presented at the Proceedings of the 5th WSEAS International Conference on E-ACTIVITIES.

Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. British journal of educational technology, 40(1), 92-118.

Wannapan, S., & Chaiboonsri, C. (2017). An Analysis of ICT Sectors and Economic Growth: Evidence from ASEAN Countries. Paper presented at the International Conference on Applied Economics.

Williams, M. D., Rana, N. P., Dwivedi, Y., Irani, Z., & Irani, Z. (2015). The unified theory of acceptance and use of technology (UTAUT): a literature review. Journal of Enterprise Information Management, 28(3).

Williams, M. D., Rana, N. P., & Dwivedi, Y. K. (2015). The unified theory of acceptance and use of technology (UTAUT): a literature review. Journal of Enterprise Information Management, 28(3), 443-488.

Wong, & Ken. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. Marketing Bulletin, 24(1), 1-32.

Wong, I. A., & Dioko, L. D. A. (2013). Understanding the mediated moderating role of customer expectations in the customer satisfaction model: The case of casinos. Tourism Management, 36, 188-199.

Yadav, P., & Mehta, P. (2014). IMPORTANCE OF ICT IN EDUCATION.

Yahya, M., Nadzar, F., & Rahman, B. A. (2012). Examining user Acceptance of E-Syariah Portal Among Syariah users in Malaysia. Procedia-Social and Behavioral Sciences, 67, 349-359.

Yamin, M., & Lee, Y. (2010). Level of acceptance and factors influencing students' intention to use UCSI University's e-mail system. Paper presented at the User Science and Engineering (i-USEr), 2010 International Conference on.

Yu, C.-S. (2012). Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. Journal of Electronic Commerce Research, 13(2), 104-121.

Yu, J., Lee, H., Ha, I., & Zo, H. (2015). User acceptance of media tablets: An empirical examination of perceived value. Telematics and Informatics.

Yu, T.-K., Lin, M.-L., & Liao, Y.-K. (2017). Understanding factors influencing information communication technology adoption behavior: The moderators of information literacy and digital skills. Computers in Human Behavior, 71, 196-208.

Yueh, H.-P., Huang, J.-Y., & Chang, C. (2015). Exploring factors affecting students' continued Wiki use for individual and collaborative learning: An extended UTAUT perspective. Australasian Journal of Educational Technology, 31(1).

Yun, G. W., & Trumbo, C. W. (2000). Comparative Response to a Survey Executed by Post, E-mail, & Web Form. Journal of Computer-Mediated Communication, 6(1), 0-0.

Yusuf, M. O., & Balogun, M. R. (2011). Student-teachers' competence and attitude towards information and communication technology: A case study in a Nigerian university. Contemporary Educational Technology, 2(1), 18-36.

Zanjani, N. (2015). Success factors of engaging higher education students and staff with e-learning tools within Learning Management Systems. Queensland University of Technology.

Zhan, Y., Wang, P., & Xia, S. (2011). Exploring the drivers for ICT adoption in government organization in China. Paper presented at the Business Intelligence and Financial Engineering (BIFE), 2011 Fourth International Conference on.

Zoumpoulaki, A., Alsufyani, A., & Bowman, H. (2015). Resampling the peak, some dos and don'ts. Psychophysiology, 52(3).

Zuiderwijk, A., Janssen, M., & Dwivedi, Y. K. (2015). Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology. Government Information Quarterly, 32(4), 429-440.