EXPLORING THE ANTECEDENTS OF BEHAVIOURAL INTENTION TO USE TECHNOLOGY AMONG UNDERGRADUATES

By

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ABSTRACT

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In Malaysia, technology use is much emphasised in the Education Blueprint 2013-2025 as the Ministry of Education foresees great potential of technology use in amplifying students' learning. Students, particularly the undergraduates, are encouraged to optimise technology use via self-paced learning for academic achievements however it has not been fully realised. Therefore, there is an urgent need to explore the antecedents that influence undergraduates' behavioural intention to use technology. The Unified Theory of Acceptance and Use of Technology model has been repeatedly tested globally across academic settings. In past studies, researchers also attempted to link achievement goals and learning styles to behavioural intention. Hence, this study aimed to explore the model by examining the existing antecedents that predict undergraduates' behavioural intention to use technology with two additional potential antecedents, namely achievement goals and learning styles. It also tested the undergraduates' technology use across different fields of study. A quantitative survey method was employed involving 699 Arts and Science undergraduates from Universiti Tunku Abdul Rahman, Malaysia. The collected data was statistically analysed using Hierarchical Multiple Regression

and T-test. The findings indicated that the undergraduates' effort expectancy, performance expectancy, social influence and achievement goals had significant influence on their behavioural intention to use technology, with effort expectancy as the strongest predictor of behavioural intention. On the other hand, there was no significant difference between the Arts and Science undergraduates' technology use. This study provides insights to the education stakeholders on the necessity to enhance pedagogical technology innovations in the higher education system. Future researchers could conduct similar studies with wider scope and methodological enhancements.

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APPROVAL SHEET

This dissertation entitled "**EXPLORING THE ANTECEDENTS OF BEHAVIOURAL INTENTION TO USE TECHNOLOGY AMONG UNDERGRADUATES"** was prepared by TINY TEY CHIU YUEN and submitted as partial fulfilment of the requirements for the degree of Master of Philosophy in Social Science at Universiti Tunku Abdul Rahman.

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DECLARATION

I Tiny Tey Chiu Yuen hereby declare that the dissertation is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

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LIST OF ABBREVIATIONS

AG	Achievement Goals
AGQ-R	Achievement Goal Questionnaire-Revised
BI	Behavioural Intention
EE	Effort Expectancy
FAS	Faculty of Arts and Social Science
FC	Facilitating Condition
FOS	Field of Study
FSc	Faculty of Science
HMR	Hierarchical Multiple Regression
LS	Learning Styles
PE	Performance Expectancy
SEM	Structural Equation Modelling
SI	Social Influence
UB	Use Behaviour
UTAR	Universiti Tunku Abdul Rahman
UTAUT	Unified Theory of Acceptance and Use of Technology
VAK	Visual-Auditory-Kinaesthetic

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In this globalisation era, the Malaysia Ministry of Education and Ministry of Higher Education have continuously thrived for the aspirations of constantly progressing education access, quality, equity, unity and efficiency in concurrence with vast development of technology (Ministry of Education, 2015). New technologies have led to internationalisation of extensive information and resources exchange through global platforms, hence widening access to higher education and alleviating course delivery. The Ministries therefore devote high expectations to accelerate the education system through technology innovations.

Educational technology challenges, initiatives and transformations are repeatedly emphasised in the Malaysia Education Blueprint 2013-2025 and Education Blueprint for Higher Education 2015-2025. According to the blueprints, the Ministries have foreseen remarkable potential of technology in intensifying and enriching the teaching-learning process and student academic achievement. As a result, the Ministries have invested large amount of money and effort to meet the educational objectives in line with the educational initiatives and transformations.

The current education system aims to strive alongside with the reshaping of industries and economies in order to deal with present and future demands, particularly the workplace. The Ministries hence encourage the higher learning institutions to use technology as a learning enabler for instructional approaches to ensure student competencies are consistent with the 21st century demands (Ministry of Education, 2015). Based on the blueprints, one of the Ministries' initiatives is to reinforce technology-boosted education in order to cater to the industrial demands and create more career pathways as well as opportunities for the students.

Furthermore, the Ministries have also dedicated great efforts to explore technology transformations which could ultimately expand student access to high quality learning experience through self-directed learning (Ministry of Education, 2013; Ministry of Education, 2015; Raman et al., 2014). Self-directed learning subscribes students to take initiative in managing their learning by identifying learning goals, strategizing learning modes and evaluating learning outcomes (Knowles, 1975; Lai, 2015; Teo et al., 2010). Moreover, it is critically essential as students pursue learning in higher education which involves higher-order thinking tasks and complex problem solving (Teo et al., 2010). As self-directed learning is gaining attention in education, technology is postulated as the precursor of self-directed learning. It is expected to function as the fundamental basis in preparing the students for the educational challenges in this technology era (Teo et al., 2010; Teo & Ting, 2010). Thus, student technology use should be

fully understood in order to develop their competency for self-directed learning.

Though the potent prospective of technology is highly anticipated, the objectives of leveraging technology for optimal educational outcomes have not yet been achieved. In 2012, UNESCO reported that technology use has not progressed beyond word-processing applications in the teaching-learning process (Ministry of Education, 2013). It is also indicated in the blueprints that most instructors were not well-trained to use technology meaningfully for effective pedagogy on a regular basis.

Therefore, the Ministries promised to strive on three main priorities as the solutions of the current technology challenges in education (Ministry of Education, 2013). Firstly, the Ministries will ensure adequate access to technology among students and instructors by delivering more technology devices such as tablets and smartphones. Secondly, a virtual learning platform will be provided with 4G network bandwidth to encourage user-created content and self-paced learning. Lastly, the Ministries will train all teachers to be competent technology users who are able to utilise technology meaningfully for pedagogy (Ministry of Education, 2013).

These proposed solutions were established through a holistic approach to fully support students and instructors' technology use. Hence, students' technology use will become more promising as these solutions guarantee technology access and support for all students. These efforts can also be

regarded as the initial stage of technology transformations dedicated by the Ministries in leveraging technology augmentation and supporting student technology use for achieving the educational objectives.

1.2 Antecedents of Behavioural Intention to Use Technology

Technology evolution has led to ubiquitous use and access to technology. There are a multitude of theoretical models which have been formulated to explain the acceptance and use of technology. Up to date, the Unified Theory of Acceptance and Use of Technology (UTAUT) model stands out as one of the most prevalent models in explaining technology acceptance and use (Decman, 2015; Marchewka, Liu, & Kostiwa, 2007). Venkatesh, Morris, Davis, and Davis (2003) formulated the UTAUT model which is based upon a number of extant theoretical models. The prominent variables in the UTAUT model are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Behavioural Intention (BI) and Facilitating Condition (FC) and Use Behaviour (UB). Meanwhile, PE, EE and SI are the antecedents that predict BI in the UTAUT model.

However, the construct of use behaviour was not investigated for the first objective. This was because the main focus of the present study was to investigate the factors influencing undergraduates' BI to use technology which overweighed their technology use. According to Karaali, Gumussoy, and Calisir (2011) and Mathieson (1991), BI is an immediate determinant of an individual's behaviour. Ajzen (1991) and Zawawi, Jusoff, Rahman, and

Idris (2009) also highlighted the connection between BI and use behaviour in which BI is a behavioural disposition that will ultimately transform into behaviour.

Pertaining to learning, there can be a variety of factors that motivate students in learning activities which ultimately affect their learning performance. However, motivation can be viewed in different forms while goal orientations for achievement vary across individual differences (Elliot & Church, 1997). Achievement goals (AG) are often related to competence and motivation which are believed to affect BI. Moreover, learning bridges the path from the education system to the ultimate goal of fulfilling the needs of kaleidoscopic fields and people. Since every student learns in different ways by employing a variety of learning styles (LS), technology can be a key element which directs a more personalised approach to learning. According to Reiff (1992), students' unique personal attributes have to be taken into account in order to address the gap in the learning preferences. LS are driven by integrated factors such as cognitive, biological and environmental characteristics (Dunn, 1984) to their actual intention to use of technology.

Related to technology use in education, Babic (2012) stated that the field of study (FOS) is one of the factors that influences students' acceptance of technology due to contexts, educational structures and classroom approaches which vary across academic disciplines. Nevertheless, there is little literature provided in explaining whether students' use of technology varies across their FOS.

In short, students' BI could be affected by many other elements other than those indicated in the UTAUT model. Meanwhile, potential factors that influence the students' BI might be AG and LS.

1.3 Problem Statement

Educational challenges and problems in the 21st century are arisen by technological disruptions (Ministry of Education, 2015). The higher education sector has experienced technological interference from mushrooming online academic programmes and courses. Simultaneously, it has also caused expectations mismatch among higher learning institutions, students and the workplace in which has ultimately led to low supplies of high technology skills in the workplace.

Hence, educational technology utilisation does not merely impact the education system per se, but also the industries where the future leaders are heading to in the foreseeable future. As stated in the Education Blueprint 2015-2025, "Higher learning institutions need to use research-validated, learner-centred, instructional approaches that utilises Information Communication Technology as learning enablers" (Ministry of Education, 2015, p. 78). Therefore, it is crucial to examine BI to use technology among students in higher education institutions in order to cater to the existing as well as impending challenges and demands in the globalisation era.

Furthermore, Ministry of Education (2013) reported that approximately RM6 billion has been invested on educational initiatives in the last ten years. This large amount of money was expected to become a catalyst to boost educational technology augmentation in Malaysia, hoping to embed technology in pedagogy and curriculum. Hence, sufficient facilities have been provided by the government to support the education transformations (Ministry of Education, 2013; Raman et al., 2014). Unfortunately, the available facilities have not yet been fully utilised by students for more productive learning outcomes.

According to Malaysia Education Blueprint 2013-2025, "The connection between ICT and student learning is more complicated than one based on more availability or use – what matters is how ICT is used. . ." (p. 171). Thus, it is crucial to explore students' BI to use technology so that they will use the facilities meaningfully in order to amplify their learning outcomes. Moreover, students, particularly the undergraduates, are encouraged to optimise their BI to use technology for self-directed learning as technology allows richer information access and generates personalised learning content despite distance and learning pace (Ministry of Education, 2015). Therefore, there is an urgent need to explore the antecedents that influence undergraduates' BI to use technology.

Venkatesh et al. (2003) suggested that more potential constructs could be considered to better explain the variance in BI in the UTAUT model. Therefore, many past studies such as Musleh, Marthandan, and Aziz (2015),

Hsu, Chen, Lin, Chang, and Hsieh (2014), and Rajapakse (2011) modified the measures of the UTAUT model to better fit the research contexts.

However, this study seeks to develop a more comprehensive depiction of the undergraduates' BI to use technology by examining the measures in the context of a higher learning institution. Therefore, potential variables related to students' learning that would better match the research context were reviewed through the previous studies. As a result, AG and LS which previous researchers attempted using to explain behaviour were selected, to better analyse undergraduates' BI to use technology.

AG have been much emphasised to learning in past studies. According to Bernacki, Aleven, and Nokes-Malach (2014), an individual is directed by certain kinds of AG as he/she engages in learning. To present, one of the very few studies which examined the influence of AG on physical activity intention was Wang, Morin, Liu, and Chian's (2016) research. Apart from that, despite the importance of AG in learning, very little research has been conducted to explore students' BI to use technology.

Besides, previous studies presented various aspects on individual differences. According to Bostrom, Olfman, and Sein (1990), LS, which differ across learners influence learning processes. Relationship between LS and BI to use technology was examined in different settings across the globe such as studies conducted in Thailand (Bhrommalee, 2012), Mexico (Cruz, Boughzala, & Assar, 2014), Libya (Elkaseh, Wong, & Fung, 2014), Taiwan (Huang, 2015;

Chang, Hung, & Lin, 2015), Brunei (Seyal & Rahman, 2015) and South Korea (Park, 2009).

In Malaysia, Balakrishnan and Gan (2016) used the Social Media Acceptance Model to examine the influence of tertiary education students' LS on their intentions to use social media for learning. The results indicated that students' LS influenced their intentions to use social media for learning purpose. Hence, the current study aims to use a more prominent model, that is, the UTAUT model to investigate if the results are in line with the past research in a similar setting.

Another relevant factor, FOS is also rarely emphasised in examining students' use of technology. Different learning environments across academic disciplines consisting of different values, cultures, habits and preconceptions of students are significant elements that cause diversities (Babic, 2012; Collins, Bulger, & Meyer, 2012; Kanuka, 2003). Also, it has been proved that students' technology use differ across their FOS (Buzzard, Crittenden, Crittenden, & McCarty, 2011; Guidry & BrckaLorenz, 2010). Therefore, there is a need to further examine whether students' technology use behaviour in the current research is in line with the previous studies.

In conclusion, the Ministries have identified effective technology use as the key of overcoming the educational challenges. Though there were innumerable previous research carried out using the UTAUT model, literature about undergraduates' BI to use technology in Malaysia through the prominent

model is still in dearth. Additionally, since many of the previous studies identified the importance of AG, LS and FOS, these variables thus shall not be overlooked. Consequently, besides primarily investigating the existing antecedents of BI to use technology in the UTAUT model, this study also aims to explore more by adding two additional variables (AG and LS) to examine Arts and Science undergraduates' BI to use technology.

1.4 Objectives

The main objective of this study is to examine the antecedents that influence undergraduates' BI to use technology through the UTAUT model. Therefore, besides exploring the existing antecedents in the UTAUT model (performance expectancy, effort expectancy and social influence), this study also aims to investigate whether the additional variables (AG and LS) have significant influence on Arts and Science undergraduates' BI to use technology. Thus, the specific objectives of the present study are as follows:

1. To examine the antecedents that influence undergraduates' behavioural intention to use technology through the UTAUT model.
2. To determine whether there is a significant difference between Arts and Science undergraduates' technology use.

1.5 Research Questions (RQ)

1. (i) Do performance expectancy, effort expectancy, social influence, achievement goals and learning styles have significant influence on the undergraduates' behavioural intention to use technology?
   (a) How much variance in behavioural intention can be explained by achievement goals and learning styles after controlling performance expectancy, effort expectancy and social influence?
   (b) Which is the best predictor of behavioural intention: performance expectancy, effort expectancy, social influence, achievement goals or learning styles?

2. Is there a significant difference in the mean scores of technology use across undergraduates' field of study (Arts and Science)?

1.6 Hypotheses

Objective 1

H1: Performance expectancy will have significant influence on the undergraduates' behavioural intention.

H2: Effort expectancy will have significant influence on the undergraduates' behavioural intention.

H3: Social influence will have significant influence on the undergraduates' behavioural intention.

H4: Achievement goals will have significant influence on the undergraduates' behavioural intention to use technology.

H5: Learning styles will have significant influence on the undergraduates' behavioural intention to use technology.

H6: The best predictor of the undergraduates' behavioural intention to use technology is performance expectancy.

Objective 2

H7: There will be a significant difference between Arts and Science undergraduates' technology use.

1.7 Significance of the Study

This study aims to contribute to the body of knowledge of undergraduates' BI to use technology. Since there is an increasing need for educators and instructors to infuse technology into the teaching-learning process in universities, this study examined the antecedents that may affect the students' BI to use technology.

Additionally, this study also aims to provide a reference for the instructors to understand students' learning pertaining to their BI to use technology across individual differences (i.e. AG and LS). Instructors may support the students' intention to use technology based upon the relevant factors in order to boost the teaching-learning effectiveness. Furthermore, identifying these differences would help the educators and instructors to

identify the technology challenges faced by Arts and Science students in the teaching-learning process.

This study targets to serve as a reference for the instructors to address the students' needs throughout the teaching-learning process, pertaining to BI to use technology. With the arrival of digital era, an educational institution must be ready to establish learning environments that provide students with digital infrastructure to cope with changes and students' needs brought about by technology advances. The utmost outcomes of technology implications can only be apprehended through regular training, updated technology resources and pertinent course applications. As the institution gives access to tools to establish a technological learning environment, accordingly the instructors will need to integrate learning medium into their pedagogy with access to creative tools which their learners consistently use. When the instructors prepare what the students need, they share the similar values as their students, and are more likely to deliver similar outcomes through the comparable teaching-learning medium. As a result, this would help to reduce mismatch in instructors' teaching style and the learners' LS.

Technology use boosts student self-directed learning in which students become independent learners who manage their own learning and develop deep-processing thinking skills to solve problems and achieve academic goals (Teo et al., 2010). Since self-directed learning is especially significant in higher education, undergraduates can be benefited by identifying the antecedents that influence their BI to use technology. They can democratise

and manage the factors that influence their BI in order to boost self-directed learning for greater academic achievements. By harnessing transferable skills, the future leaders can forge opportunities for themselves in the workplace and contribute their expertise to the Malaysian and global community.

This study can also become a reference or a guide for the policy makers. Effort and costs invested on education technological transformations have to be profoundly considered while designing and developing a curriculum or an academic scheme. For instance, needs assessment is required prior to curriculum planning and designing to ensure learning objectives can be derived into effective teaching-learning. If AG is a significant antecedent of students' BI to use technology, AG could be considered in the needs assessment. This will help the policy makers to identify students' goal orientations and decide the technology applications in the curriculum according to the students' AG for optimal learning outcomes. Therefore, this study could provide an indication of the antecedents that influence undergraduates' BI to use technology in which further necessary solutions can be planned in order to meet the education objectives.

1.8 Definition of Terms

The theoretical framework is based on the UTAUT model developed by Venkatesh et al. (2003). Below are the definitions for the variables which were investigated to explore undergraduates' BI to use technology in the UTAUT model.

1.8.1 Performance Expectancy (PE)

Venkatesh et al. (2003) defined PE as the degree to which an individual believes on the use of a system in helping him or her to gain attainments in job performance. In this study, it refers to how much the undergraduates believe in the use of technology to boost their studies and task productivity.

1.8.2 Effort Expectancy (EE)

Meanwhile, EE is defined as the degree of ease pertaining to the use of the system (Venkatesh et al., 2003). However, in the present study, EE means the degree of ease associated with the undergraduates' use of technology in the institution.

1.8.3 Social Influence (SI)

SI is defined as the degree to which an individual perceives others who are important in their life and believe he or she should use the new system (Venkatesh et al., 2003). Therefore, in this study, SI means the degree to which the undergraduates perceive that important people in their life think they should use technology.

1.8.4 Behavioural Intention (BI)

Van Schaik (2009) defined BI as users' intention to use a system. Azjen (1991), Zawawi et al. (2009) and Karaali et al. (2011) also stated that BI represents the likelihood whether an individual will perform or execute a particular behaviour. Besides, BI is a direct determinant and behavioural disposition of actual behaviour (Azjen, 1991; Mathieson, 1991). In this study, BI indicates the undergraduates' intention or plan to utilise technology.

1.8.5 Achievement Goals (AG)

Generally, AG represent one's focus, engagement and purpose on a particular task (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Hanham, Ullman, Orlando, & McCormick, 2014). In the present study, AG refer to the students' purpose in adopting technology which is measured by Elliot and Murayama's Achievement Goal Questionnaire-Revised (AGQ-R) (2008) with four orientations:

Performance approach in AG refers to individuals who are performance-approach-oriented. They are positively normative and they usually focus on attaining normative competence. Meanwhile, these individuals strive to gain competency that others perceive competent (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Murayama, 2008). In the present study, these undergraduates are directed to attain favourable judgements toward their performance competency.

Meanwhile, mastery approach is often referred to intentional learning as individuals with this AG are positively intrapersonal-oriented (Elliot & McGregor, 2001). They engage in task and strategise learning in order to attain development of competence based on one's own requirements (Elliot & Harackiewicz, 1996; Elliot & Murayama, 2008; Hanham et al., 2014). Therefore, in this study, mastery approach refers to undergraduates who focus on intentional learning competence.

Performance avoidance is described as one's negatively normative goal. These individuals often hide their incompetency and avoid incompetency when compared to the others (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Finney, Pieper, & Barron, 2007). In the present study, undergraduates' with performance avoidance goal often avoid unfavourable judgements of performance competency from the others.

Mastery avoidance in AG is also known as negatively intrapersonal goal. It is defined as one's learning intention to attain mastery of task in order to avoid incompetence. These individuals often strive to avoid performing more poorly than one's own past (Elliot & McGregor, 2001; Elliot & Murayama, 2008). Thus, in the present study, the focus goal of these undergraduates is often to avoid intentional learning incompetency.

1.8.5.1 Goal

According to Elliot and his colleagues, a goal serves as a guide or a cognitive representation which leads an individual to approach or avoid for future behaviour (Elliot, 2006; Elliot & Murayama, 2008). Elliot (2006) also defined goal as one's conscious and intentional commitments which can also be referred to as a predictor of behaviour. On the other hand, according to the Cambridge Advanced Learners' Dictionary (2013), a goal is a long-term aim. Thus, by integrating Elliot and the dictionary's definition, "goal" in the present study is defined as the undergraduates' long-term attempt that they endeavour to achieve in their current undergraduate programme.

1.8.5.2 Aim

As defined in the Cambridge Advanced Learners' Dictionary (2013), an aim is similar to a goal. However, in order to depict clearer difference between "goal" and "aim", especially the terms used in the questionnaire, an "aim" is narrowed down to refer to a short-term aim. Therefore, in the present study, "aim" indicates the undergraduates' short-term attempt that they endeavour to achieve something during the academic semester.

1.8.6 Learning Styles (LS)

LS generally refer to the way that an individual likes to learn (Sternberg & Grigorenko, 2001). It is also stated that LS are individuals'

characteristics, which are influenced by biological and environmental factors (separately and simultaneously), can contribute to his/her concentration and attention (Dunn, 1984; Reynolds, & Fletcher-Janzen, 2002). Besides, LS are cognitive behaviours or habits which an individual demonstrates in his/ her learning processes (Pritchard, 2009). In this study, LS refer to the undergraduates' preferred ways in learning based on the Visual-Auditory-Kinaesthetic (VAK) LS which comprises visual, auditory and kinaesthetic learning style.

Visual learning style refers to visual learners who learn well from seeing (Dunn 1984; Reid, 1987). They depend on visual stimuli such as words, pictures, diagrams, facial expressions, body language, and videos (Montemayor, Aplaten, Mendoza, & Perey, 2009). These learners are encouraged to use graphic organisers and colourful notes in learning to help them to attain better understanding through visual stimulation (Gregory, 2007). Hence, in this study, visual learning style indicates the undergraduates' learning preference via reading, visualising, seeing, looking and/or watching.

Auditory learning style is defined as learners who prefer discovering information via listening (Dunn 1984; Reid, 1987). Auditory learners learn best when they listen to spoken words and oral clarifications. They prefer listening to audio tapes, conversations, discussions and lectures (Gilakjani, 2012). In this study, the auditory learners are the undergraduates who learn best when they listen and/or speak.

Kinaesthetic learning style refers to learners who learn best through hands-on experience and classroom activities (Dunn 1984; Reid, 1987). They learn best via participation in activities such as role-playing and field trips which involve high physical mobility (Montemayor et al., 2009). In this study, the kinaesthetic learners are the undergraduates who learn best through physical activities and movements such as touching, moving and/or experimenting.

1.8.7 Field of Study (FOS)

FOS is also known as academic discipline which the undergraduates in the present research who are studying in UTAR. There are two fields of study involved:

1.8.7.1 Arts

As defined in the Cambridge Advanced Learners' Dictionary (2013), Arts is referred to as subjects that are not scientific subjects, such as languages and philosophy. In this study, such programmes offered are under the Faculty of Arts and Social Science (FAS) in the university. Hence, Arts programmes mentioned are: Bachelor of Arts (Hons) English Education, Bachelor of Communication (Hons) Advertising, Bachelor of Communication (Hons) Public Relations, Bachelor of Communication (Hons) Journalism, Bachelor of Social Science (Hons) Psychology, and Bachelor of Arts (Hons) English Language.

1.8.7.2 Science

The Cambridge Advanced Learners' Dictionary (2013) defines Science as subjects that are studied through scientific method, such as physical sciences. In the present study, these programmes are under the Faculty of Science (FSc) in the university. The Science programmes mentioned refer to: Bachelor of Science (Hons) Agricultural Science, Bachelor of Science (Hons) Food Science, Bachelor of Science (Hons) Biotechnology, Bachelor of Science (Hons) Microbiology, Bachelor of Science (Hons) Biochemistry, Bachelor of Science (Hons) Chemistry, Bachelor of Science (Hons) Logistics and International Shipping, and Bachelor of Science (Hons) Statistical Computing and Operations Research.

1.8.8 Technology Use

Technology is referred to any tools or techniques that can be used to accomplish an extended range for practical purposes and knowledge (Luppicini, 2005). Meanwhile, technology use behaviour is defined as the practical utilisation of a technology system (Umrani-Khan & Iyer, 2009). In this study, technology use indicates the undergraduates' behaviour or practical utilisation of any technology tools or techniques for their academic learning processes.

1.9 Conclusion

In conclusion, this chapter provides an overview to this study. A more detailed background of this research will be discussed in the next chapter with the review of previous studies and literature pertaining to this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter 2 is presented in thematic divisions. It contains the review of literature based on the theoretical frameworks of this study. Relevant previous studies and findings pertaining to technology use in education, the UTAUT model, BI to use technology, AG and LS are also discussed in this chapter. The conceptual framework is presented in a diagram with elaborations in the final section of this chapter.

2.2 Technology in Education

The learning paradigm has gradually shifted from a deductive approach to a more inductive approach in which technology exudes a boosting effect in education (Buzzard et al., 2011). Over the last two decades, technology has been identified as one of the most important elements that contribute to richer teaching-learning experiences and more successful learning outcomes (Guirdy & BrckaLorenz, 2010; Teo & Lee, 2010). As a result, educational technology use has continued to rise radically.

Utilising technology for academic purposes has created an influx in the educational platform, whereby the integration of technology into learning has promoted the globalisation of education (Sage, Bonacorsi, Izzo, & Quirk, 2015). Thus, students can access to the ever-expanding resources, not limited to only the printed materials. Students are also allowed to reach out to massive online resources where the worldwide interchange of information takes place. Educational technology has therefore generated a more constructive and student-centred learning environment (Fook, Sidhu, Kamar, & Aziz, 2011). Thus, students are able to navigate their own learning progress and learn proactively at their own pace with richer personalised learning experience.

In this era of technology, much effort and investment have been dedicated to educational technology development and implementation (Marchewka et al., 2007; Olatubosun, Olusoga, & Shemi, 2014; Raman et al., 2014). In Malaysia, the government is aware of the magnitude of technology utilisation in education. The Ministry of Education has emphasised the significance of technology and refined the educational technology policies in order to embrace technology in the education context more intensively (Ministry of Education, 2013).

In an effort to practise education transformation, the Malaysian Ministry of Education had started strengthening its education system through providing computers and building computer laboratories back in the 1970s (Raman et al., 2014). The Ministry of Education of Malaysia has continuously

shown great effort for technological transformation in education by providing necessary infrastructure in schools and trainings for teachers (Raman et al., 2014). The government's support for educational technology is also reflected in the Malaysia Education Blueprint for Higher Education 2015-2025, with great emphasis on online learning for tertiary education (Balakrishnan and Gan, 2016). According to the blueprint, all higher learning institutions in Malaysia are set to implement a combination of online and conventional pedagogy approach for teaching and learning.

Evidently, Malaysia is striving towards the goal to becoming a technology-driven country to consolidate the education system as technology is believed to be a potentially useful tool to enhancing learning experience, developing teaching-learning contents, enriching teacher-student interaction and meeting students' needs (Al-Gahtani, Hubona, & Wang, 2007; Fook et al., 2011; Seyal & Rahman, 2015).

2.3 The UTAUT Model

According to Lin, Zimmer, and Lee (2013b), technology use models explain technology acceptance and technology utilisation. The UTAUT model is one of the most recent and widely used models which explain factors for technology acceptance and use respectively across individual differences (Marchewka et al., 2007; Cruz et al., 2014). Besides, Olatubosun et al. (2014) also echoed that the UTAUT model is one of the most comprehensive, powerful and robust technology acceptance and adoption models to present.

Venkatesh et al. (2003) formulated the UTAUT model based on nearly twenty years of research and studies on technology acceptance and adoption. The model was founded with integration of eight theoretical models: (i) Motivational Model, (ii) Theory of Planned Behaviour, (iii) Technology Acceptance Model, (iv) Theory of Reasoned Action, (v) Model of PC Utilization, (vi) Innovation Diffusion Theory, (vii) Combined TAM-TPB, and (viii) Social Cognitive Theory.

The formulation of the UTAUT model was due to overwhelming theoretical models created to explaining user acceptance on technology by researchers from a multitude of expertise such as information systems, sociology and psychology (Venkatesh et al., 2003). However, these theoretical models only explain approximately 40 percent of the variance in a person's technology use intention.

Venkateh and his colleagues reviewed the eight prominent models by comparing and contrasting their features, then conducted empirical assessments of the explanatory power of each of the model in order to consolidate the eight existing models into one unified model. With success, the UTAUT model outperformed against the eight extant theoretical models with a promising result of explaining 70 percent of the variance in technology use intention (Marchewka et al., 2007; Venkatesh et al., 2003). As a result, the UTAUT model was proven to better explain the variance of use intention than the previous models (Khechine, Lakhal, Pascot, & Bytha, 2014; Venkatesh et al., 2003).

There are four key factors in the UTAUT model which play important roles as direct determinants of user acceptance and use behaviour: PE, EE, SI and Facilitating Conditions (FC) (Venkatesh et al., 2003). The model (Figure 2.1) then presents three direct determinants to assess BI towards the use of technology (PE, EE and SI), two direct determinants of UB (FC and BI), and four contingencies (age, gender, experience and voluntariness) affecting behaviour and/or intention towards the use of technology (Venkatesh & Zhang, 2010).

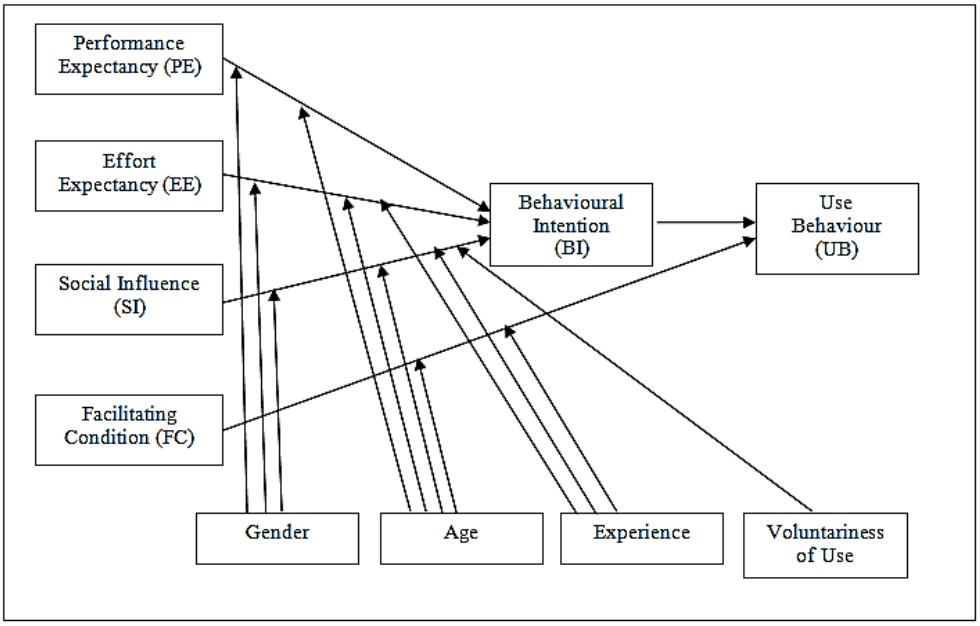


Figure 2.1: The UTAUT Model

In the UTAUT model, the three direct determinants of BI are PE, EE and SI. PE is related to an individual's endeavour for task productivity and his/her use of technology is highly task-oriented (Brown, Dennis, & Venkatesh, 2010; Venkatesh et al., 2003; Venkatesh & Zhang, 2010). Most of the past studies have acknowledged the significant predicting influence of PE

on BI (Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014; Raman et al., 2014; Venkatesh et al., 2003; Wang & Shih 2009), as well as in higher education setting (Bandyopadhyay & Fraccastoro, 2007). According to Lin, Lu, & Liu (2013a) PE has been consistently proven to be the most robust and strong predictor of BI. This is also supported by Almatari, Iahad, and Balaid (2013), Jambulingam (2013), Mtebe and Raisamo (2014) and Teo & Noyes (2014).

Whilst, EE is regarded as the level of ease an individual perceives when he/she uses technology (Dulle & Minishi-Majanja, 2011; Venkatesh et al., 2003; Venkatesh & Zhang, 2010). EE is also a significant antecedent that predicts the intention of technology use (Bandyopadhyay & Fraccastoro 2007; Jairak, Praneetpolgrang, & Mekhabunchakij, 2009; Nassuora 2012; Venkatesh et al., 2003; Wang & Shih 2009).

Meanwhile, SI represents the level of ease an individual perceives while using technology (Raman et al., 2014; Venkatesh et al., 2003; Venkatesh & Zhang, 2010). Though SI prediction ability of user intention has been less clear than PE and EE (Brown et al., 2010), it still indicates positive effect on technology use intention (Bandyopadhyay & Fraccastoro 2007; Im et al. 2011; Jairak et al. 2009; Venkatesh et al., 2003; Wang & Shih 2009).

FC and BI are the direct determinants of UB in the UTAUT model (Venkatesh et al., 2003). BI refers to an individual's plan to utilise technology (Van Schaik, 2009; Venkatesh et al., 2003). Since the 1980s, the influence of

intention on behaviour has been proved significant (Ames, 1992; Sheppard et al., 1988; Venkatesh et al, 2003; Weiner, 1985). According to Venkatesh et al. (2003), intention is a key predictor which antecedes usage. Therefore, the focus of this research will be on the factors that influence BI to use technology among undergraduates. The present study would not measure the influence of FC and BI on use behaviour.

According to Decman (2015), most of the UTAUT studies showed significant relationships among the antecedents with exemption of the moderators in the model. Therefore, the four contingencies (age, gender, experience and voluntariness of use) were excluded in this study because they are moderating variables which affect the relationships between the determinants and UB (Baron & Kenny, 1986; Brown et al., 2010). It might not be apt to compare demographic data with an adoption of a non-random sampling method (Gruzd, Staves, & Wilk, 2012) as employed in this study. The prominent reason is because this study only focuses on the antecedents that influence BI to use technology in the UTAUT model: PE, EE and SI.

2.3.1 UTAUT in Education

The UTAUT model is most commonly used in business-related and organisational research to examine technology acceptance and utilisation; while its application in the education research field is also gradually rising in recent years (Birch & Irvine, 2009; Marchewka et al., 2007). Some of the research done in education using the UTUAT model are Cruz et al. (2014),

Dulle and Minishi-Majanja (2011); Lin et al. (2013a); Lewis et al. (2013); Marques, Villate, and Carvalho (2011); Olatubosun et al. (2014); Raman et al. (2014); Tan (2013); and Thomas, Singh, and Gaffar (2013).

Over the last decade, the UTAUT model has been extensively used in the educational context, especially in e-learning and mobile learning (Cruz et al., 2014; Lin, 2013a; Thomas et al., 2013). However, from the review of documents, there is a dearth of investigation on BI to use technology in the context of Malaysian tertiary education. According to Cassidy et al. (2014), technology evolution has impacted education as students' exposure to technology has increased dramatically. As Cassidy and her colleagues reported, students' technology utilisation for academic purposes, such as the use of e-reader, has doubled in four years.

Thus, the UTAUT model has been widely employed to investigate educational technology acceptance and adoption in both developed and developing countries across the globe (Mtebe & Raisamo, 2014). Despite developed countries like the United States (Solvie & Kloek, 2007) and Australia (Lynch, Debuse, Lawley, & Roy, 2009), many of the previous studies have also been carried out in developing countries. Some of these past studies were conducted in countries like Libya (Elkaseh et al., 2014), Mexico (Cruz et al., 2014), Thailand (Bhrommalee, 2012), Nigeria (Agbatogun, 2013) as well as Malaysia (Raman et al., 2014), where the implementation of technology in education is still in their infancy. This implies that these

developing countries are expecting a new leap, and are striving to explore educational technology adoption.

In sum, past studies showed similar results that PE, EE and SI demonstrated significant prediction ability on BI (Bandyopadhyay & Fraccastoro 2007; Im, Hong, & Kang. 2011; Jairak et al. 2009; Lewis et al., 2013; Tan, 2013; Venkatesh et al., 2003; Wang & Shih 2009). However, far less attention has been paid to learning-oriented variables that may provide more insightful understanding on students' intention to use technology in the Malaysian higher education setting. Therefore, besides PE, EE and SI, this study included two additional learning-related variables the factors that lead to investigate the undergraduates' BI to use technology with the UTAUT model as the primary theoretical foundation.

2.4 Behavioural Intention to use Technology

Venkatesh et al. (2003) reported that BI has significant influence on use behaviour. BI is defined as an individual's plan to perform an action (Van Schaik, 2009). BI also refers the possibility is an individual is likely take action on a particular behaviour (Azjen, 1991; Mathieson, 1991). Meanwhile, Cruz et al. (2014) suggested that an individual's behaviour can be explained by a person's BI as it involves personal decision to perform certain future behaviour. Karaali et al. (2011) also mentioned that BI includes motivational factors which will lead to use behaviour.

Azjen (1991) explained that behaviour can be determined by BI:

> Intentions are assumed to capture the motivational factors that influence behaviour. They are indications of individual's intention to perform a given behaviour. Intentions are assumed to capture the motivational factors that influence a behaviour; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour. As a general rule, the stronger the intention to engage in behaviour, the more likely should be its performance. (p. 181)

Besides, based on Azjen's (1991) review of literature, evidence in relation to the association between intention and behaviour has started since the 1980s. It explained the dispositional prediction effect of intention towards behaviour. Therefore, intention can represent behavioural usage with considerable accuracy (Azjen, 1991). This is supported by Kaaali et al. (2011) and Zawawi et al. (2009) which underscored BI as an immediate determinant of an individual's behaviour. The studies also emphasised the association between BI and behaviour whereby BI will lead to actual behaviour. Consequently, the current study measured the undergraduates' BI to use technology instead of their use behaviour and focused to exploring the factors that influence BI to use technology.

2.5 Achievement Goals and Behavioural Intention to Use Technology

The AG theorists often view AG as the cognitive-dynamic focus which leads to competence-relevant behaviour or activity of an individual (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Finney et al., 2007). As one of the pioneers of AG Theory, Elliot suggested that AG are closely related to an individual's motivation and personal characteristics which relatively different across individual differences (Elliot & Church, 1997).

Since the 1980s, the importance of goal orientations has been emphasised in educational settings because it is likely to exude extra values to learning, skills, competency and achievement (Elliot & Harackiewicz, 1996). In addition, Ames (1992) and Weiner (1985) also affirmed that AG can ultimately lead to intentions of behaviour. Therefore, attention towards AG has been growing and often related to learning indicated in past studies (Agbatogun, 2013; Bernacki et al., 2014; Bulus, 2011; Edens, 2006; Goraya & Hasan, 2012; Hanham et al., 2014; Wang et al., 2016). Bernacki et al. (2014) refined the previous researchers' views on academic settings and claimed that AG can impact students' learning behaviour and performance throughout their learning processes.

Agbatogun (2013) also pointed out that the infusion of technology into the teaching-learning process is significant. This involves in increasing teaching-learning motivation. Motivation, however, is claimed to be an AG-

oriented behaviour. Besides, Bulus (2011) reported that studies since the last decade have proposed the relationship between individual's goal orientations and their impact on students' learning behaviours. According to Bulus (2011) and Yi and Hwang (2003), goal orientations are significant elements that influence students to pursue intentional performance in order to achieve a learning target.

In Wang et al. (2016), AG theory was used to examine students' physical activity intentions. The research identified 1810 school children's AG profiles from 13 Singaporean schools using the 2 x 2 AG framework to investigate the influence of AG profiles on their intentions to pursue physical activities. The overall results indicated that students with higher level of AG showed greater likelihood of pursuing physical actions and intentions in participating physical activities (Wang et al., 2016).

In this study, the AG theory is also based upon Elliot and McGregor's 2 x 2 AG framework (2001), which has been proved feasible to be implemented in academic contexts (Finney et al., 2007). Elliot and McGregor first developed the 2 x 2 AG framework with the Achievement Goal Questionnaire (AGQ), while Elliot continued revising the questionnaire in order to help students to attend carefully to the items. As a result, Elliot and Murayama (2008) revised and designed another 12-item questionnaire based upon the original 2 x 2 AG framework. Herein, this study employed the revised AGQ (AGQ-R) as it is tailored for students.

		Definition	
		Absolute/ intrapersonal (mastery)	*Normative (performace)*
Valence	*Positive (approaching success)*	Mastery-approach goal	Performance-approach goal
	Negative (avoiding failure)	Mastery-avoidance goal	Performance-avoidance goal

Figure 2.2: The 2 x 2 Achievement Goal Framework

Elliot and McGregor (2001) highlighted that the notion of AG is conceptualised upon "competence". It was initially divided into three categories: absolute (task-oriented), intrapersonal (potential-attainment-oriented) and normative (performance-oriented). However, Elliot and McGregor identified the overlapping conceptual characteristics between absolute and intrapersonal competence. Later, the notion of competence was rearranged through the formulation of two fundamental AG dimensions, namely definition, and valence.

There are two orientations of AG which fall under the definition dimension are mastery (absolute/ intrapersonal) and performance (normative). Mastery represents an individual's motivation to enhance competency (Finney et al., 2007). Meanwhile, performance is regarded as accomplishment that an individual endeavours to attain as to obtain favourable judgement on his/her competency (Elliot & McGregor, 2001; Finney et al., 2007; Wang et al., 2016). Valence, another dimension in this framework, comprises two orientations: approach (positive) and avoidance (negative). According to Elliot and Harackiewicz (1996), approach orientation is viewed positively as

it involves task mastery and development of competence. Conversely, avoidance orientation is negatively oriented as it involves prevention undesirable judgement from the others instead of focusing on the task itself.

The definition and valence dimension then intersect and form a 2 x 2 AG framework which comprises four categories of goals (as shown in Figure 2.2). Thus, this study was conducted based on the framework, which integrates the definition and valence dimension, entailing the four AG: performance approach, mastery approach, performance avoidance and mastery avoidance.

Firstly, performance approach entails the attainment of competence in order to gain favourable judgement on performance competency (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Finney et al., 2007). This type of learner strives to master a course material in order to obtain good results in an examination (Elliot & Church, 1997; Goraya & Hasan, 2012). Mastery approach, on the other hand, refers to an individual's intentional attainment of competency based on his/her own requirement (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Wang et al., 2016). The learner takes initiatives to learn as the learner truly wants to master a course material (Elliot & Church, 1997; Elliot & McGregor, 2001).

Next, performance avoidance is an individual's avoidance on his/her incompetence in order to get rid of unfavourable judgement (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001; Wang et al., 2016). For

instance, it refers to a learner who attends to a course material in order to avoid failing an exam (Elliot & Church, 1997; Goraya & Hasan, 2012). Lastly, mastery avoidance is defined as an individual's attainment of competency in order to prevent oneself from performing poorly (Elliot & McGregor, 2001; Elliot & Murayama, 2008). For example, a learner strives to avoid any negative possibility such as misunderstanding or failing to master a course material (Elliot & Church, 1997; Elliot & McGregor, 2001).

2.6 Learning Styles and Behavioural Intention to Use Technology

LS emerged as early as in the 1960's with great attention in research related to students' learning (Huang, 2015). To date, there are many higher learning institutions which are still attempting to personalise students' learning experience through the implementation of technologies in order to support teaching-learning. Therefore, LS which emphasise on learner's personal preference has been one of the focuses in pedagogy research.

According to Chang et al. (2015), LS are considered as "individual's habitual pattern of processing and acquiring information in learning situations. The adaptive learning style has also received considerable attention, with numerous researchers applying knowledge about learning styles to their development of adaptive educational systems" (p. 531). Huang (2015) described LS as personalised psychological behaviour that indicates the way learners perceive, interact, and respond to the learning environments. Similarly, Balakrishnan & Gan (2016), defined LS as the approach of how

individual interact, attain knowledge, or respond to external stimuli in their learning environments.

Dunn (1984) explained that LS involve students' attention, thoughts and retention of information, while these processes vary across individuals. Since individual differences and attributes are considered as important factors in the UTAUT model, researchers often choose meaningful and relevant individual factors based on the researchers' point of view (Cruz et al., 2014; Lin et al., 2013a). According to Lin et al. (2013b), individual differences like LS is considered an essential factor which influences the students' technology adoption related to information systems.

Besides, as Smith and Kolb asserted, matching learning environment to the students' LS is a very crucial factor throughout their learning process (as cited in Bhrommalee, 2012). A number of previous studies were conducted to examine the influence of LS on BI. Among the most recent research included Chang et al. (2015), Cruz et al. (2014), Elkaseh et al. (2014), Huang (2015), and Seyal and Rahman (2015). In a more similar setting, Elkaseh's et al. (2014) research studied the influence of LS on BI to use e-learning in Libyan higher education. The respondents were 318 university students from four Libyan universities. Results of the study indicated that students of all LS showed similar BI to use e-learning in Libyan higher education (Elkaseh et al., 2014). In Seyal and Rahman (2015), the research investigated the influence of LS on BI to use e-learning system among 120 students' from computing and business faculties in a Bruneian tertiary learning institution. The results

showed that LS had a significant influence on the students' BI to use e-learning (Seyal & Rahman, 2015).

The present study employed the VAK LS to examine the influence of the undergraduates' LS on their BI to use technology. VAK LS is one of the oldest LS frameworks, which was first developed by psychologists and professionals in the 1920's (Chislett & Chapman, 2005; Hatami, 2012). Visual learners are more holistic learners who link input to imagery concepts, like to observation and learn by sight. They are keen on visual displays such as charts and graphs as well as seeing colourful pictures and illustrations (Gregory, 2007). Brown (2007) explained that visual learners prefer pictorial stimuli including words, charts, and images. In addition, they attain better understanding when an idea is presented with gestures and observable expression (Gilakjani, 2012).

Next, auditory learning involves listening and speaking in which the learners learn best through sound stimuli. They prefer listening to spoken delivery such as lectures, songs and changes in intonation (Martin, 2012). Therefore, these strategies and activities are useful to assist auditory learners: playing audio recordings, highlight on keywords or main ideas orally, and present ideas and opinions verbally.

For kinaesthetic learners, physical mobility and experiences are indispensible throughout their learning process. Engaging in motor-oriented activities such as role-play can enable students to retain input into long-term

memory (Worley-Davis, 2011). Additionally, they can retain the information for a long period and gain a better understanding when the activities are highly connected to their personal experiences and feelings.

2.7 Field of Study and Technology Use

As technology has been much related to learning, disciplinary differences are also gaining attention from the relevant studies. Babic (2012) indicated that FOS represents a situational factor which affects learning environment and mode of acquiring knowledge in the teaching-learning processes. This is due to differences in culture, tradition, context and expectation within each FOS or academic discipline.

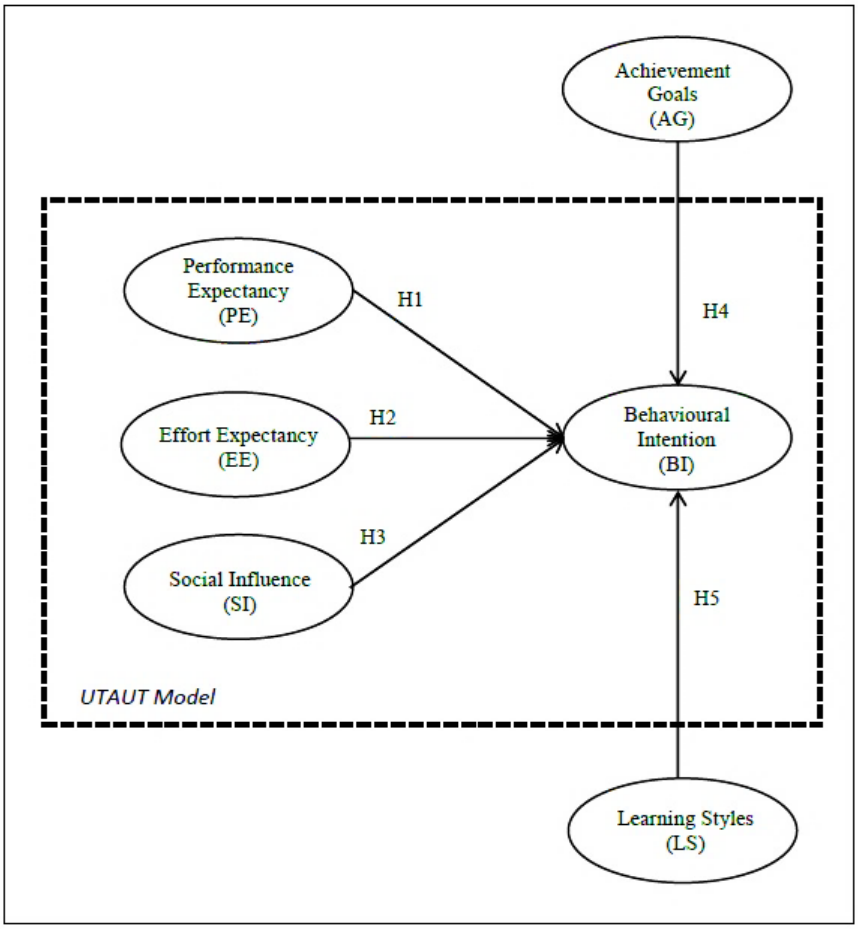
One of the recent studies conducted in the United States, involving 18 institutions reported that students from certain FOS such as education demonstrated higher technology use than the other disciplines (Guirdy & BrckaLorenz, 2010). Besides, a result of a research which looked into six case studies also summarised that disciplinary differences affect technology use (Collins et al., 2012).

In contrast, a study carried out in a Hong Kong university found that there was no significant difference between Arts and Science undergraduates' overall scores in an ICT course (Wong & Cheung, 2012). Buzzard et al. (2011) also reported in their research that the students use technology despite of their FOS. Due to inconsistent findings in previous studies, there is a need to

examine whether the undergraduates' technology use is different across their FOS in a Malaysian academic setting.

2.8 The Conceptual Framework

Given the backgrounds, the primary objective of the this study is to explore the antecedents of BI to use technology among undergraduates through the UTAUT model. As a result, the conceptual framework of this study is formulated as shown in Figure 2.8. The UTAUT model is explored through the investigation of the original antecedents (PE, EE, and SI) of BI in the UTAUT model, with two newly added antecedents, LS and AG. Lastly, this study also examined whether Arts and Science undergraduates' technology use differ across their FOS.



Note. H indicates Hypothesis.

Figure 2.3: The Conceptual Framework

The selection of the UTAUT model for this study was motivated by its extensiveness and high explanatory power as compared to other technology acceptance and use theories (Venkatesh et al., 2003). The original UTAUT model entails several suitable individual attributes including PE, EE, and SI that are apt to explain undergraduates' BI to use technology. In order to explore other potential antecedents that influence undergraduates' BI to use technology, AG and LS were selected from literature as the additional antecedents. Moreover, academic discipline was also identified as an important aspect pertaining to technology use among students.

Through this framework, this study will provide a better understanding on BI to use technology among undergraduate students in a Malaysian tertiary education setting by adding education-oriented variables, namely AG and LS into the UTAUT model.

2.9 Conclusion

In short, Chapter 2 encompasses the review of literature and theoretical frameworks related to this study and the conceptual framework of the present research. The following chapter provides a comprehensive description of the methodology of this study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter encompasses the research methods employed in this study. It starts with the research design and research paradigm, followed by the questionnaire development and a description of the research procedure. The sampling procedure is discussed supported by explanations on the sampling method and the sampling size determination. Additionally, the instrument reliability in the actual test and the pilot test are presented in tables with descriptions. The following sections include discussions on the instrument validity and ethical considerations. Lastly, this chapter is concluded with a preview of the data analysis techniques used in this study.

3.2 Research Design and Research Paradigm

This study uses quantitative survey research methodology. This research method is employed as it can generate factual and descriptive information, and it is preferred methodology prevalent in research which involves a causal analysis (De Vaus, 2002). The research design also allows the researcher to collect systematic data in order to examine if the variables in

the UTAUT model significantly influence the undergraduates' behavioural intention to use technology.

The present study is constructed from a normative research paradigm. According to Cohen, Manion, and Morrison (2011), a normative paradigm study focuses on positivism and human behaviour in a natural phenomenon. Hence, positivist researchers play the role to further explain the human collective real-life behaviour which is manifested in a society, an institution or an organisation (Cohen et al., 2011). Hence, this study was constructed through normative paradigm, in line with the research aims, to examine the antecedents that influence the undergraduates' BI to use technology and technology use based on their FOS.

3.3 Questionnaire Development

A quantitative survey was developed based on three extant questionnaires: BI to use technology was measured with the UTAUT model questionnaire (Venkatesh et al., 2003); while AG was measured with AGQ-R (Elliot & Murayama, 2008); and LS was measured with the VAK LS questionnaire (Chislett & Chapman, 2005). According to Straub, Boudreau, and Gefen (2004), research instrument adopted can be modified to enhance its content validity. Therefore, the questionnaires were adapted or self-developed in order to fit the purpose and context of the present study. Permissions to use the instruments were granted by the researchers (Appendix A, B and C).

The questionnaire (Appendix D) consists of four parts with a total of 127 items. The first part comprises brief instruction, followed by personal demographic information including age, gender, name of the programme and previous academic qualification. The information collected was to provide a better understanding towards the participants' background and academic-related information.

The second part is labelled as Part A. It consists of the UTAUT model questionnaire with 26 items. All the items in Part A are seven-point Likert scales. For PE, EE, SI and BI, the scales range from 1 = "Strongly Disagree" to 7 = "Strongly Agree". Meanwhile, UB scale consists of seven closed-ended items ranging from 1 = "Never" to 7 = "Very often", and followed by one open-ended item to measure the total hours the undergraduates use technology per day.

Next, the third part of the survey is labelled as Part B and it consists of 12 items adapted from AGQ-R. It also uses a seven-point Likert scale with 1 = "Completely NOT true for me" and 7 = "Extremely True for me". The AG construct consists of four scales with three items for each scale, namely performance approach, performance avoidance, mastery approach, and mastery avoidance.

Lastly, Part C consists of 90 items measuring LS. Each item is made up of a five-point Likert scale from "Never", "Sometimes", "Often", "Usually" to "Always". There are three scales in the VAK LS construct, namely visual

learning style, auditory learning style and kinaesthetic learning style. Each of these scales comprises 30 items.

3.4 Procedure

The study was conducted in UTAR, Perak, Malaysia from June to November 2014. The data was collected within two consecutive academic semesters, one long semester (fourteen study weeks) and one short semester (seven study weeks). The questionnaire was manually distributed to the undergraduates within the campus. Most of the data were collected in lecture halls and tutorial classrooms with permission from the lecturers or tutors.

The researcher explained the purpose of the study to the undergraduates and asked for their consent before they participated in the study (Appendix E). The respondents were given sufficient time to complete the questionnaire. They were also given timely assistance when they faced difficulties while completing the questionnaire. Consequently, a total of 699 usable questionnaires were collected throughout the six months.

3.5 Sampling

3.5.1 Sampling Method

Stratified sampling is a widely used sampling technique in many types of research especially for large data (Tipton, et al., 2014; Ye, Wu, Huang, Ng, & Li, 2013). Tipton et al. (2014) and Ye et al. (2013) also highlighted that this

technique allows a researcher to divide the population into smaller independent strata or subgroups, then draw a simple random from each stratum. According to Ye et al. (2013), stratified sampling method enables a researcher to ensure each stratified group captures sufficient key features and important characteristics of each stratum. Therefore, a probability stratified sampling was employed in this study complementing Krejcie and Morgan's (1970) formula for sample selection (Cohen et al., 2011). Since this study aims to compare technology use of Arts and Science undergraduates, the undergraduates were selected from Arts and Science faculties.

3.5.2 Determining Sample Size

In the present study, the target population involved undergraduates from two FOS, namely FAS and FSc. The table below shows the updated population size for FAS and FSc; 2045 undergraduates from FAS and 1257 from FSc as of October 2014.

Table 3.1: Population of FAS and FSc Undergraduates in UTAR

Field of Study	Population size (N)
Faculty of Arts and Social Science (FAS)	2045
Faculty of Science (FSc)	1257
Total	3302

Note. As updated in October Trimester 2014.

According to Barlett, Kotrlik, and Higgins (2001), the appropriate sample size is essential for quality and accuracy of a research, particularly in a survey study. Israel (1992) suggested a variety of approaches for determining sample size, such as replicating a sample size of an identical

study, calculating a sample size using formulas and referring to published tables.

One of the most notable and widely used formulas to determine a research sample is Krejcie and Morgan's (1970) formula:

$$s = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

To calculate the required sample size for FAS (N = 2045), substitute values into the equation:

$$s = \frac{(3.841)\ (2045)(0.50)(1\text{-}0.50)}{(0.05)^2(2045\text{-}1)+(3.841)(0.50)(1\text{-}0.50)}$$

$$= 323.4976$$

Thus, the minimum required sample size for FAS in this study is 324 undergraduates. Similarly, in order to calculate the required sample size for FSc, substitute N = 1257 into the equation:

$$s = \frac{(3.841)\ (1257)(0.50)(1\text{-}0.50)}{(0.05)^2(1257\text{-}1)+(3.841)(0.50)(1\text{-}0.50)}$$

$$= 294.3806$$

Hence, the minimum required sample size for FSc in this study is 295.

Besides prevalent Krejcie and Morgan's formula, Barlett et al. (2001) also provided a sample size determination table (Appendix F) for researchers' reference. Barlett et al.'s table includes sample size reference for categorical and continuous data, with alpha levels and margin of errors. According to Barlett et al. (2001), data type of the dependent variable is used as a reference to determine the recommended sample size in this table. Since the dependent variable is a continuous variable, the recommended sample size (margin of error = .03, $\alpha = .05$, $t = 1.96$) is 112 for FAS and 110 for FSc.

Moreover, Israel's (1992) sample size determination table (Appendix G) was also used in determining the sample size. According to the table, the suggested sample size for FAS was 333, while FSc was 286 with $\pm 5\%$ precision levels where confidence level is 95% and $p = .5$.

With recommendations above, a total of 699 respondents participated in this study: 388 from FAS and 311 from FSc. Hence, the obtained sample size in the present study is sufficient based on Krejcie and Morgan's formula and Barlett et al.'s (2001) table as it exceeds the suggested sample size. Also, the collected sample size in this study is beyond the required sample size and is very close to the sample size as Israel (1992) recommended. Thus, the obtained sample size is once again proven apt for this study.

Table 3.2: Obtained Sample Size

Field of Study	Obtained sample size (n)
Faculty of Arts and Social Science (FAS)	388
Faculty of Science (FSc)	311
Total	699

3.6 Instrument Reliability

3.6.1 Pilot Test

Reliability of a measurement refers to the consistency of a measurement and the degree to which it is free from random error (Pallant, 2013). In this study, the reliability analysis was measured using Cronbach's Alpha, with a recommended value of .70 or higher (DeVellis, 2003; Nunnally & Bernstein, 1994).

A reliability analysis was conducted for the pilot test of the present study. The questionnaire was administered to 60 Arts and Science undergraduates from UTAR, 30 from FAS and FSc respectively, in order to test the measurement reliability. The reliability analysis for each scale in the constructs: UTAUT model, AG and VAK LS, was measured.

Table 3.3 is a summary of all of the scales tested in the UTAUT model. The construct is reliable as each computed statistic is above .70, while the reliability of the overall UTAUT construct is .903 (25 items).

Table 3.3: Instrument Reliability: UTAUT Model (n = 60)

Scales	Number of Items	Cronbach's Alpha
Performance Expectancy (PE)	4	.812
Effort Expectancy (EE)	4	.841
Social Influence (SI)	5	.738
Behavioural Intention (BI)	5	.918
Technology Use	7	.737

Note. Reliability of the UTAUT model: .903 (25 items).

Table 3.4 is a summary of instrument reliability for the AG construct in this pilot test. As shown in the reliability analysis result, the AG construct has good internal consistency, with a Cronbach's Alpha coefficient value of .878 (12 items).

Table 3.4: Instrument Reliability: Achievement Goals (n = 60)

Scales	Number of Items	Cronbach's Alpha
Performance Approach	3	.877
Mastery Approach	3	.722
Performance Avoidance	3	.741
Mastery Avoidance	3	.769

Note. Reliability of the AG construct: 0.878 (12 items).

Based on the reliability test results in Table 3.5, the VAK LS construct employed in the present pilot study also indicated a good internal consistency, with a Cronbach's Alpha coefficient value of .961 (90 items).

Table 3.5: Instrument Reliability: VAK Learning Styles (n = 60)

Scales	Number of Items	Cronbach's Alpha
Visual Learning Style	30	.901
Auditory Learning Style	30	.904
Kinaesthetic Learning Style	30	.898

Note. Reliability of VAK Learning Style: .961 (90 items).

Since all the scales and constructs in the pilot test indicated good reliability as each computed statistic is above .70, none of the items was removed and all items in the pilot test were remained in the actual study.

3.6.2 Actual Test

The reliability analysis for the actual test questionnaire which consists of UTAUT, AG and VAK LS constructs also showed good consistency.

Table 3.6 shows the instrument reliability of the UTAUT model in this present study. As shown in the reliability analysis result, the UTAUT construct portrays good internal consistency, with a Cronbach's Alpha coefficient value of .913 (25 items).

Table 3.6: Instrument Reliability: UTAUT Model (*n* = 699)

Scales	Number of Items	Cronbach's Alpha
Performance Expectancy	4	.841
Effort Expectancy	4	.859
Social Influence	5	.757
Behavioural Intention	5	.900
Technology Use	7	.799

Note. Reliability of the UTAUT model: .913 (25 items).

Furthermore, Table 3.7 is a summary of all of the scales tested in the AG construct. The Cronbach's Alpha for each scale is reliable as each computed statistic is above .70, while the reliability of the AG construct is 0.903 (12 items).

Table 3.7: Instrument Reliability: Achievement Goals (*n* = 699)

Scales	Number of Items	Cronbach's Alpha
Performance Approach	3	.817
Mastery Approach	3	.733
Performance Avoidance	3	.824
Mastery Avoidance	3	.777

Note. Reliability of the AG construct: 0.903 (12 items).

Lastly, a reliability analysis result for the VAK LS construct is indicated in Table 3.8. The Cronbach's Alpha coefficient reported for this construct was .948 (90 items), with every scale exceeds the threshold value of .70. Therefore, the VAK LS construct is reliable.

Table 3.8: Instrument Reliability: VAK Learning Styles (*n* =699)

Scales	Number of Items	Cronbach's Alpha
Visual Learning Style	30	.857
Auditory Learning Style	30	.882
Kinaesthetic Learning Style	30	.878

Note. Reliability of VAK Learning Style: .948 (90 items).

3.7 Instrument Validity

The validity of an instrument indicates the degree to which the measure assesses what it is supposed to assess in a particular study (Pallant, 2013). According to Cohen et al. (2011), the validity of research instruments must prove them comprehensively measure the domains that they are supposed to cover so that the findings can be generalised to a broader population.

The UTAUT model had been empirically tested with four participating organising organisations, and further validated via cross-validation with another two organisations (Venkatesh et al., 2003). Consequently, the results supported the UTAUT model as a strong model with combined explanatory power exceeding the previous eight extant frameworks.

On the other hand, the 2 x 2 AG framework had been validated across three studies through exploratory factor analyses and confirmatory factor analysis (Elliot & McGregor, 2001). According to Elliot and McGregor (2001), the developed framework revealed a high degree of validity with all scales appropriately fit the framework.

However, the VAK LS framework has yet to be scientifically validated (Chislett & Chapman, 2005). Therefore, this study emphasises on content validity whereby the instrument was examined by instrument validation panel consisted of two experts in this research area.

The questionnaire was reviewed by a panel of two experienced experts in educational technology in relevant research areas for its content and face validity. The instrument validation panel examined and reviewed the content validity of the instrument. Necessary modifications were done based on the experts' comments and feedback prior to the pilot test (Appendix H and I).

PE1	
Before:	I find technology useful in my studies.
After:	Technology will be useful in my studies.
SI3	
Before:	The administration has supported the use of technology.
After:	The management has supported the use of technology.

Figure 3.1: Modified Items Based on the Experts' Comments

Besides, one of the panellists also commented that the candidate should state specific instructions at the beginning of each section of the instrument. Hence, instructions were added in such as "Part A: Tick (√) only ONE option for each of the following items" (see Appendix D).

3.8 Statistical Significance Level

In educational and social science studies, it is prevalent to use the statistical significance level (α) of .05 (Cohen et al, 2011; Stevens, 2012). Considering the sample size of the current study (n = 699), statistical significance level of .05 is also recommended for studies involving large sample size that contains more than 150 samples (Cohen, 2013; Pallant, 2013). As a result, the level of significance is set at .05 ($\alpha = .05$) and 5% of the difference in the results should be accounted in this study.

3.9 Ethical Considerations

There are a number of key ethical issues in social research such as harm, consent, privacy and confidentiality of data (Punch, 2013). According to Cohen et al. (2011), using a questionnaire in a research might be regarded risky as it invades the respondents' life. Several measures were also recommended such as obtaining questionnaire respondents' informed consent, informing the degree of threats or sensitivity, and providing the guarantees of confidentiality (Cohen et al., 2011).

Hence, the researcher protects the participants from the potential risks by conforming to the policies as stated in the university Research Ethics and Code of Conduct and Code of Practice for Research Involving Humans. Prior to data collection, the researcher obtained the university approval from the university Scientific and Ethical Review Committee (Appendix J).

Furthermore, the researcher also obtained informed and voluntary consent of the potential participants in this study. Several issues such as confidentiality and potential benefits were highlighted in the printed consent form. The consent form also entailed a statement of declaration signed by the researcher. The participants in this study gave their consent by signing on the consent form (Appendix E).

3.10 Data Analysis Techniques

In this study, data analysis was conducted using Statistical Package for the Social Sciences (SPSS) Version 21.

Demographic data including age, gender, FOS and academic qualification in this study were analysed via descriptive statistics to provide numerical descriptions about the participants. In addition, descriptive analyses illustrating the participants' BI to use technology in the UTAUT model, as well as AG and LS were also conducted in order to provide a better understanding on the results and findings in this study. These results will be presented in detail in the subsequent chapter.

Hierarchical multiple regression (HMR) analysis was conducted to examine the UTAUT model, and the predictability of the undergraduates' AG and LS on their BI to use technology. HMR was employed to assess the independent variables which enter into the equation in the order based on the theoretical grounds (Pallant, 2013). According to Pallant (2013) and Cohen et al. (2013), HMR allows the researcher to examine the predictive ability of the independent variables on the dependent variable in sequence, after the effect of a variable is being controlled for.

On the other hand, according to Pallant (2013), the independent-samples t-test is used to compare the mean scores for two groups in order to examine whether there is any statistical difference between the two groups. Therefore, in line with Research Question 2, independent-samples t-test was used to compare Arts and Science undergraduates' technology use in this study.

3.11 Conclusion

In conclusion, the research methodology and procedure involved in this study has been discussed in Chapter 3. The results yielded from both descriptive and inferential analyses will be discussed in the next chapter.

CHAPTER 4

RESULTS

4.1 Introduction

Chapter 4 presents descriptions of the participants' demographic information, followed by a series of descriptive and inferential analyses to answer the research questions of this study. The subsequent section highlights the results related to the hypotheses of the study. Lastly, this chapter is concluded with closing remarks.

4.2 Participants

The sample or participants of a study are defined as a subset of a population that can function as a representative of a large group of total population (Cohen et al., 2011). The sample consists of 699 Arts and Science undergraduates from UTAR. As shown in Table 4.1, there were 218 males (31.2%) and 481 females (68.8%) who participated in the study.

Table 4.1: Number of Respondents by Gender

Gender	Frequency (n)	Percentage (%)
Male	218	31.20
Female	481	68.80
Total	699	100.00

Table 4.2 provides a summary of the respondents according to FOS. The sample from each FOS is almost equal: 388 Arts undergraduates (55.5%) from FAS and 311 Science undergraduates (44.5%) from FSc.

Table 4.2: Number of Respondents by Field of Study

Field of Study	Frequency (n)	Percentage (%)
Faculty of Arts and Social Science (FAS)	388	55.50
Faculty of Science (FSc)	311	44.50
Total	699	100.00

Table 4.3 shows the number of respondents according to the undergraduate programmes. The majority of the FAS respondents were from the Bachelor of Social Science (Hons) Psychology with 130 undergraduates (33.51%), followed by 77 Bachelor of Communication (Hons) Public Relations undergraduates (19.85%), 72 Bachelor of Arts (Hons) English Language undergraduates (18.56%), 64 Bachelor of Arts (Hons) English Education undergraduates (16.49%), 35 Bachelor of Communication (Hons) Advertising undergraduates (9.02%), and lastly, 10 Bachelor of Communication (Hons) Journalism undergraduates (2.58%).

Table 4.3: Number of Respondents according to Programmes Offered by FAS

Name of Programme	Frequency (n)	Percentage (%)
Bachelor of Arts (Hons) English Education	64	16.49
Bachelor of Arts (Hons) English Language	72	18.56
Bachelor of Communication (Hons) Advertising	35	9.02
Bachelor of Communication (Hons) Journalism	10	2.58
Bachelor of Communication (Hons) Public Relations	77	19.85
Bachelor of Social Science (Hons) Psychology	130	33.51
Total	388	100.00

For FSc respondents, the majority of the respondents are from the Bachelor of Science (Hons) Biomedical Science with 93 undergraduates (29.90%), followed by 66 undergraduates (21.22%) from the Bachelor of

Science (Hons) Chemistry, 54 (17.36%) undergraduates from the Bachelor of Science (Hons) Biotechnology, 37 (11.90%) undergraduates from the Bachelor of Science (Hons) Logistics and International Shipping, 24 (7.72%) undergraduates from the Bachelor of Science (Hons) Food Science, 22 (7.07%) undergraduates from the Bachelor of Science (Hons) Statistical Computing and Operations Research, 7 (2.25%) undergraduates from the Bachelor of Science (Hons) Biochemistry, 6 (1.93%) undergraduates from the Bachelor of Science (Hons) Microbiology, and only 2 (0.64%) undergraduates from the Bachelor of Science (Hons) Agricultural Science.

Table 4.4: Number of Respondents according to Programmes Offered by FSc

Name of Programme	Frequency (n)	Percentage (%)
Bachelor of Science (Hons) Agricultural Science	2	0.64
Bachelor of Science (Hons) Biochemistry	7	2.25
Bachelor of Science (Hons) Biomedical Science	93	29.90
Bachelor of Science (Hons) Biotechnology	54	17.36
Bachelor of Science (Hons) Chemistry	66	21.22
Bachelor of Science (Hons) Food Science	24	7.72
Bachelor of Science (Hons) Logistics and International Shipping	37	11.90
Bachelor of Science (Hons) Microbiology	6	1.93
Bachelor of Science (Hons) Statistical Computing and Operations Research	22	7.07
Total	311	100.00

Table 4.5 represents the respondents' academic qualification before entering the university. More than half of the respondents attended a Foundation programme, while 224 of the respondents (32.0%) were Sijil Tinggi Persekolahan Malaysia students. There were only 19 of the respondents (2.7%) received an A-level qualification, followed by 30 of them (4.3%) graduated from a Diploma programme. Meanwhile, the 40 respondents (5.7%) in this study were from several other academic backgrounds, such as United Examination Certificate and Matriculation.

Table 4.5: Number of Respondents by Academic Qualification (Prior to Bachelor's Degree)

Academic Qualification	Frequency (n)	Percentage (%)
Sijil Tinggi Persekolahan Malaysia	224	32.00
Diploma	30	4.30
Foundation	386	55.20
A-level	19	2.70
Other	40	5.70
Total	699	100.00

Table 4.6 is a description of the respondents' age, ranging from 18 to 27 (M = 20.46, SD = 1.37). Most of the respondents aged at 19 (29.8%), followed by 20 (25.5%), and 21 (25.0%). On the other hand, only a handful number of the undergraduates aged at 25 and above.

Table 4.6: Age of the Respondents

Age	Frequency (n)	Percentage (%)
18	2	0.30
19	208	29.80
20	178	25.50
21	175	25.00
22	78	11.20
23	41	5.90
24	10	1.40
25	3	0.40
26	3	0.40
27	1	0.10
Total	699	100.00

4.3 Descriptive Analysis

Descriptive analysis is an essential procedure which yields numerical descriptions of the data (Kleinbaum, Kupper, Nizam, & Rosenberg, 2013). This section provides the descriptive analysis for every scale in the UTAUT, AG and LS constructs that are measured in this study.

4.3.1 Descriptive Analysis for UTAUT Model

Descriptive statistical analyses describing the antecedents of undergraduates' BI to use technology in the UTAUT model are presented from Table 4.7 to Table 4.12. Table 4.7 is a summary of descriptive analysis for the undergraduates' PE. The statistics suggests that most of the undergraduates perceive technology as an effective tool to speed up their task accomplishment (M = 6.07, SD = 1.03) and will be useful for their studies (M = 6.05, SD = 1.08). Furthermore, the undergraduates also believe that technology use will improve their task productivity (M = 5.81, SD = 1.11) and academic performance (M = 5.09, SD = 1.21).

Table 4.7: Descriptive Statistics for Performance Expectancy (PE) (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
PE1: Technology will be useful in my studies.	2 (0.3%)	5 (0.7%)	7 (1.0%)	46 (6.6%)	131 (18.7%)	200 (28.6%)	308 (44.1%)	6.05	1.08
PE2: Using technology will enable me to accomplish tasks more quickly.	2 (0.3%)	6 (0.9%)	6 (0.9%)	32 (4.6%)	125 (17.9%)	235 (33.6%)	293 (41.9%)	6.07	1.03
PE3: Using technology will increase my productivity.	2 (0.3%)	5 (0.7%)	11 (1.6%)	72 (10.3%)	145 (20.7%)	244 (34.9%)	220 (31.5%)	5.81	1.11
PE4: Using technology will increase my chances of getting better academic results.	4 (0.6%)	8 (1.1%)	42 (6.0%)	161 (23.0%)	244 (34.9%)	133 (19.0%)	107 (15.3%)	5.09	1.21

Note. PE (M = 5.76, SD = 0.91). 1: Strongly Disagree; 2: Disagree ; 3: Slightly Disagree; 4: Neither Agree Nor Disagree; 5: Slightly Agree; 6: Agree; 7: Strongly Agree.

Table 4.8 provides the descriptive analysis for the undergraduates' EE. It shows that most of the undergraduates are relatively confident to become skilful technology user (*M* = 5.36, *SD* = 1.17) and to use technology at ease (*M* = 5.28, *SD* = 1.17). They believe interacting with technology is understandable (*M* = 5.21, *SD* = 1.17) and learning to operate technology is easy (*M* = 5.12, *SD* = 1.23) for them.

Table 4.8: Descriptive Statistics for Effort Expectancy (EE) (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
EE1: My interaction with technology would be understandable.	5 (0.7%)	9 (1.3%)	21 (3.0%)	140 (20.0%)	263 (37.6%)	149 (21.3%)	112 (16.0%)	5.21	1.17
EE2: It would be easy for me to become skilful at using technology.	3 (0.4%)	8 (1.1%)	31 (4.4%)	97 (13.9%)	239 (34.2%)	196 (28.0%)	125 (17.9%)	5.36	1.17
EE3: I would find technology easy to use.	3 (0.4%)	7 (1.0%)	31 (4.4%)	125 (17.9%)	231 (33.0%)	186 (26.6%)	116 (16.6%)	5.28	1.17
EE4: Learning to operate technology would be easy for me.	4 (0.6%)	13 (1.9%)	47 (6.7%)	133 (19.0%)	232 (33.2%)	173 (24.7%)	97 (13.9%)	5.12	1.23

Note. EE (*M* = 5.24, *SD* = 0.99). 1: Strongly Disagree; 2: Disagree; 3: Slightly Disagree; 4: Neither Agree Nor Disagree; 5: Slightly Agree; 6: Agree; 7: Strongly Agree.

Table 4.9 represents the undergraduates' perceptions on SI towards their technology use. The descriptive statistics suggests that the lecturers slightly encourage the undergraduates to use technology (*M* = 4.89, *SD* = 1.24) and have been quite supportive on their technology use (*M* = 4.83, *SD* = 1.22). Additionally, important people (*M* = 4.52, *SD* = 1.32) and those who influence the undergraduates' behaviour (*M* = 4.51, *SD* = 1.31) play neutral role in

influencing their technology use. Whereas, the undergraduates slightly agree that the university management team is helpful in their technology use (*M* = 4.43, *SD* = 1.40).

Table 4.9: Descriptive Statistics for Social Influence (SI) (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
SI1: People who influence my behaviour think that I should use technology.	15 (2.1%)	31 (4.4%)	82 (11.7%)	230 (32.9%)	182 (26.0%)	112 (16.3%)	45 (6.4%)	4.51	1.31
SI2: People who are important to me think that I should use technology.	14 (2.0%)	37 (5.3%)	74 (10.6%)	226 (32.3%)	184 (26.3%)	120 (17.2%)	44 (6.3%)	4.52	1.32
SI3: The management team of this university has been helpful in the use of technology.	27 (3.9%)	37 (5.3%)	89 (12.7%)	190 (27.2%)	209 (29.9%)	104 (14.9%)	43 (6.2%)	4.43	1.40
SI4: My lecturers have been supportive in the use of technology.	12 (1.7%)	14 (2.0%)	55 (7.9%)	169 (24.2%)	247 (35.3%)	152 (21.7%)	50 (7.2%)	4.83	1.22
SI5: My lecturers encourage the use of technology.	11 (1.6%)	11 (1.6%)	59 (8.4%)	165 (23.6%)	231 (33.0%)	159 (22.7%)	63 (9.0%)	4.89	1.24

Note. SI (*M* = 4.64, *SD* = 0.93). 1: Strongly Disagree; 2: Disagree ; 3: Slightly Disagree; 4: Neither Agree Nor Disagree; 5: Slightly Agree; 6: Agree; 7: Strongly Agree.

The undergraduates' BI in technology adoption is statistically described in Table 4.10. As demonstrated in the table, the majority of the undergraduates agree that they will use technology in the future (*M* = 6.09, *SD* = 1.06) and plan to use technology often (*M* = 5.82, *SD* = 1.18). They also predict (*M* = 5.70, *SD* = 1.21), plan (*M* = 5.67, *SD* = 1.25) and intend (*M* = 5.56, *SD* = 1.25) to use technology in the next few months.

Table 4.10: Descriptive Statistics for Behavioural Intention (BI) (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
BI1: I intend to use technology in the next few months.	6 (0.9%)	5 (0.7%)	27 (3.9%)	98 (14.0%)	168 (24.0%)	209 (29.9%)	186 (26.6%)	5.56	1.25
BI2: I predict I would use technology in the next few months.	6 (0.9%)	5 (0.7%)	16 (2.3%)	80 (11.4%)	167 (23.9%)	208 (29.8%)	217 (31.0%)	5.70	1.21
BI3: I plan to use technology in the next few months.	7 (1.0%)	7 (1.0%)	20 (2.9%)	84 (12.0%)	157 (22.5%)	210 (30.0%)	214 (30.6%)	5.67	1.25
BI4: I will use technology in the future.	5 (0.7%)	3 (0.4%)	6 (0.9%)	31 (4.4%)	129 (18.5%)	215 (30.8%)	310 (44.3%)	6.09	1.06
BI5: I plan to use technology often.	3 (0.4%)	6 (0.9%)	16 (2.3%)	71 (10.2%)	146 (20.9%)	210 (30.0%)	247 (35.3%)	5.82	1.18

Note. BI (*M* = 5.77, *SD* = 1.01). 1: Strongly Disagree; 2: Disagree; 3: Slightly Disagree; 4: Neither Agree Nor Disagree; 5: Slightly Agree; 6: Agree; 7: Strongly Agree.

The descriptive statistics in Table 4.11 indicates the undergraduates' UB. The analysis suggests that most of the undergraduates use technology to communicate with others very often (*M* = 6.21, *SD* = 0.93). Interestingly, the undergraduates' technology adoption is highly related to their studies work since the statistics entails high frequency use of computer (*M* = 6.19, *SD* = 0.95) and internet (*M* = 6.14, *SD* = 0.98) for course-related work. In addition, the undergraduates spend time for leisure via internet (*M* = 6.11, *SD* = 1.06) more often than using a computer (*M* = 5.93, *SD* = 1.22). Meanwhile, they communicate via instant messaging (*M* = 5.83, *SD* = 1.26) more often than they check email (*M* = 4.88, *SD* = 1.70).

Table 4.11: Descriptive Statistics for Use Behaviour (UB) (n = 699)

Questionnaire Item	1 Never	2	3	4	5	6	7 Very often	Mean	SD
UB1: I check my email.	21 (3.0%)	57 (8.2%)	73 (10.4%)	126 (18.0%)	134 (19.2%)	132 (18.9%)	156 (22.3%)	4.88	1.70
UB2: I communicate via instant messaging.	8 (1.1%)	6 (0.9%)	18 (2.6%)	73 (10.4%)	122 (17.5%)	208 (29.8%)	264 (37.8%)	5.83	1.26
UB3: I use the Internet for course-related work.	1 (0.1%)	1 (0.1%)	9 (1.3%)	31 (4.4%)	121 (17.3%)	216 (30.9%)	320 (45.8%)	6.14	0.98
UB4: I use computer for course-related work.	1 (0.1%)	0 (0%)	8 (1.1%)	29 (4.1%)	108 (15.5%)	224 (32.0%)	329 (47.1%)	6.19	0.95
UB5: I use the internet for leisure.	3 (0.4%)	2 (0.3%)	8 (1.1%)	44 (6.3%)	110 (15.7%)	207 (29.6%)	325 (46.5%)	6.11	1.06
UB6: I use the computer for leisure.	4 (0.6%)	7 (1.0%)	20 (2.9%)	61 (8.7%)	114 (16.3%)	201 (28.8%)	292 (41.8%)	5.93	1.22
UB7: I use technology to communicate with others.	1 (0.1%)	0 (0%)	6 (0.9%)	25 (3.6%)	121 (17.3%)	208 (29.8%)	338 (48.4%)	6.21	0.93

Note. UB (M = 5.90, SD = 0.80).

Moreover, Table 4.12 is the summary of descriptive analysis for the UTAUT model. As shown in the table, technology use (M = 5.90, SD = 0.80) scored the highest mean value followed by BI (M = 5.77, SD = 1.01), PE (M = 5.76, SD = 0.91), and EE (M = 5.24, SD = 0.99). Meanwhile, SI value (M = 4.64, SD = 0.93) was the antecedent ranked at the lowest mean value.

Table 4.12: Descriptive Statistics for UTAUT Model (n = 699)

Variables	Mean	Std Dev.
Performance Expectancy (PE)	5.76	0.91
Effort Expectancy (EE)	5.24	0.99
Social Influence (SI)	4.64	0.93
Behavioural Intention (BI)	5.77	1.01
Technology Use	5.90	0.80

Besides, an average of hours spend per day on technology was measured using an open-ended item in the survey. The undergraduates reported that they use technology approximately 7 hours a day (M = 6.87, SD = 4.37).

4.3.2 Descriptive Analysis for Achievement Goals

Tables 4.13, 4.14, 4.15, 4.16 and 4.17 demonstrate descriptive analyses of the undergraduates' AG.

The undergraduates' performance approach is summarised in Table 4.13. The statistical results suggest that most of the undergraduates aim to perform well compared to others in that semester (M = 5.22, SD = 1.32) and strive to achieve their aim (M = 5.05, SD = 1.31). Moreover, most of the undergraduates responded that it is true that their goal is to perform better than other students in their current programme (M = 4.78, SD = 1.50).

Table 4.13: Descriptive Statistics for Performance Approach (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
PAP1: My goal is to perform better than other students in this programme.	26 (3.7%)	36 (5.2%)	41 (5.9%)	181 (25.9%)	194 (27.8%)	122 (17.5%)	99 (14.2%)	4.78	1.50
PAP2: My aim is to completely perform well relative to other students in this semester.	11 (1.6 %)	18 (2.6%)	25 (3.6%)	122 (17.5%)	225 (32.2%)	170 (24.3%)	128 (18.3%)	5.22	1.32
PAP3: I am striving to do well compared to the other students.	13 (1.9%)	19 (2.7%)	35 (5.0%)	144 (20.6%)	226 (32.3%)	168 (24.0%)	94 (13.4%)	5.05	1.31

Note. PAP: Performance approach (M = 5.02, SD = 0.91). 1: Completely Not True for Me; 2: Not True for Me; 3: Slightly Not True for Me; 4: Neutral; 5: Slightly True for Me; 6: True for Me; 7: Extremely True for Me.

Table 4.14 provides a descriptive analysis of the undergraduates' mastery approach. It appears that the undergraduates strive to understand the content as thoroughly as possible (M = 5.40, SD = 1.17) in their current undergraduate programme. It is also true that their goal is to learn as much as possible during the semester (M = 5.77, SD = 1.09). Moreover, they also slightly agree that they aim to maximise their material mastery in that semester (M = 5.04, SD = 1.28).

Table 4.14: Descriptive Statistics for Mastery Approach (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
MAP1: My goal is to learn as much as possible in this programme.	2 (0.3%)	4 (0.6%)	13 (1.9%)	63 (29.0%)	180 (25.8%)	229 (32.8%)	208 (29.8%)	5.77	1.09
MAP2: My aim is to completely master the material presented this semester.	16 (2.3%)	11 (1.6%)	35 (5.0%)	141 (20.2%)	253 (36.2%)	153 (21.9%)	90 (12.9%)	5.04	1.28
MAP3: I am striving to understand the content of this programme as thoroughly as possible.	3 (0.4%)	8 (1.1%)	18 (2.6%)	121 (17.3%)	215 (30.8%)	195 (27.9%)	139 (19.9%)	5.40	1.17

Note. MAP: Mastery approach (*M* = 5.40, *SD* = 1.01). 1: Completely Not True for Me; 2: Not True for Me; 3: Slightly Not True for Me; 4: Neutral; 5: Slightly True for Me; 6: True for Me; 7: Extremely True for Me.

In Table 4.15, the descriptive analysis suggests that the majority undergraduates slightly agree that they would like to avoid poor academic performance compared to others in their current undergraduate programme (*M* = 5.33, *SD* = 1.37). Similarly, they also aim to prevent themselves from performing worse than others during the semester (*M* = 5.25, *SD* = 1.39) and are striving to achieve the aim (*M* = 5.21, *SD* = 1.37).

Table 4.15: Descriptive Statistics for Performance Avoidance (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
PAV1: My goal is to avoid performing poorly compared to others in this programme.	16 (2.3%)	9 (1.3%)	26 (3.7%)	116 (16.6%)	206 (29.5%)	160 (22.9%)	166 (23.7%)	5.33	1.37
PAV2: My aim is to avoid doing worse than other students this semester.	17 (2.4%)	18 (2.6%)	28 (4.0%)	107 (15.3%)	210 (30.0%)	177 (25.3%)	142 (20.3%)	5.25	1.39
PAV3: I am striving to avoid performing worse than the others.	16 (2.3%)	13 (1.9%)	29 (4.1%)	133 (19.0%)	204 (29.2%)	165 (23.6%)	139 (19.9%)	5.21	1.37

Note. PAV: Performance avoidance (*M* = 5.27, *SD* = 5.24). 1: Completely Not True for Me; 2: Not True for Me; 3: Slightly Not True for Me; 4: Neutral; 5: Slightly True for Me; 6: True for Me; 7: Extremely True for Me.

Table 4.16 provides the descriptive analysis for mastery avoidance. The undergraduates tend to slightly agree that they strive to avoid incomplete understanding of the course material (*M* = 5.26, *SD* = 1.18). Furthermore, the analysis also reveals that the undergraduates' goal is to avoid learning less than they could in their undergraduate programme (*M* = 5.24, *SD* = 1.42) during the semester (*M* = 5.23, *SD* = 1.39).

Table 4.16: Descriptive Statistics for Mastery Avoidance (n = 699)

Questionnaire Item	1	2	3	4	5	6	7	Mean	SD
MAV1: My goal is to avoid learning less than it is possible to learn in this programme.	19 (2.7%)	17 (2.4%)	33 (4.7%)	106 (15.2%)	201 (28.8%)	182 (26.0%)	141 (20.2%)	5.24	1.42
MAV2: My aim is to avoid learning less than I possibly could this semester.	18 (2.6%)	18 (2.6%)	27 (3.9%)	103 (14.7%)	227 (32.5%)	169 (24.2%)	137 (19.6%)	5.23	1.39
MAV3: I am striving to avoid incomplete understanding of the course material.	6 (0.9%)	5 (0.7%)	24 (3.4%)	136 (19.5%)	243 (34.8%)	162 (23.2%)	123 (17.6%)	5.26	1.18

Note. MAV: Mastery avoidance (*M* = 5.24, *SD* = 1.10). 1: Completely Not True for Me; 2: Not True for Me; 3: Slightly Not True for Me; 4: Neutral; 5: Slightly True for Me; 6: True for Me; 7: Extremely True for Me.

Table 4.17 is a summary of the descriptive analysis for the undergraduates' AG. In this study, the undergraduates showed similar positive attitude towards all goals in Elliot and McGregor's AG (2008). The undergraduates show strongest goal orientation towards mastery approach (*M* = 5.40, *SD* = 1.01), followed by performance avoidance (*M* = 5.27, *SD* = 0.8), mastery avoidance (*M* = 5.24, *SD* = 1.1), and lastly, performance approach (*M* = 5.02, *SD* = 0.91).

Table 4.17: Descriptive Statistics for Achievement Goals (AG) (n = 699)

Variables	Mean	SD
Performance Approach	5.02	0.91
Mastery Approach	5.40	1.01
Performance Avoidance	5.27	0.80
Mastery Avoidance	5.24	1.10

4.3.3 Descriptive Analysis for Learning Styles

Descriptive statistical analysis of the undergraduates' LS is summarised in Tables 4.18, 4.19, 4.20 and 4.21. Table 4.18 provides a statistical description of the undergraduates' visual learning style. The statistical results suggest that most of the undergraduates show preference to write notes or draw diagrams while revising for exam (M = 4.18, SD = 0.96). However, they are less likely to follow a written instruction while trying on a new recipe (M = 2.07, SD = 1.23).

Table 4.18: Descriptive Statistics for Visual Leaning Style (n = 699)

Questionnaire Item		1	2	3	4	5	Mean	SD
VLS1	When I operate new equipment, I generally: read instruction first.	27 (3.9%)	274 (39.2%)	294 (42.1%)	0 (0%)	104 (14.9%)	2.83	1.01
VLS2	When I need directions for travelling, I: look at a map.	50 (7.2%)	217 (31.0%)	142 (20.3%)	162 (23.2%)	128 (18.3%)	3.14	1.24
VLS3	When I cook a new dish, I like to: follow a written recipe.	306 (43.8%)	195 (27.9%)	87 (12.4%)	66 (9.4%)	45 (6.4%)	2.07	1.23
VLS4	When I operate new equipment, I generally: read instruction first.	92 (13.2%)	149 (21.3%)	138 (19.7%)	184 (26.3%)	136 (19.5%)	3.18	1.32
VLS5	During my free time, I most enjoy: going to museums or galleries.	21 (3.0%)	117 (16.7%)	147 (21.0%)	226 (32.3%)	188 (26.9%)	3.63	1.13

Table 4. 18 (continued)

VLS6	I tend to say: watch how I do.	53 (7.6%)	194 (27.8%)	140 (20.0%)	151 (21.6%)	161 (23.0%)	3.25	1.29
VLS7	When I go shopping for clothes, I tend to: imagine what they would look like on.	46 (6.6%)	181 (25.9%)	185 (26.5%)	182 (26.0%)	105 (15.0%)	3.17	1.17
VLS8	When I choose to go for a holiday, I usually: read lots of brochures.	13 (1.9%)	52 (7.4%)	118 (16.9%)	214 (30.6%)	302 (43.2%)	4.06	1.03
VLS9	If I buy a new car, I would: read reviews in newspapers or magazines.	29 (4.1%)	119 (17.0%)	153 (21.9%)	202 (28.9%)	196 (28.0%)	3.60	1.18
VLS10	When I am learning a new skill, I am most comfortable: watching what the teacher is doing.	97 (13.9%)	163 (23.3%)	143 (20.5%)	163 (23.3%)	133 (19.0%)	3.10	1.33
VLS11	If I am choosing food off a menu, I tend to: imagine what the food will look like.	12 (1.7%)	108 (15.5%)	193 (27.6%)	206 (29.5%)	180 (25.8%)	3.62	1.08
VLS12	When I listen to a band, I can't help: watching the band members or the audience.	23 (3.3%)	106 (15.2 %)	149 (21.3%)	207 (29.6%)	214 (30.6%)	3.69	1.15

Table 4.18 (continued)

VLS13	When I concentrate, I most often: focus on the words or the pictures in front of me.	47 (6.7%)	138 (19.7%)	150 (21.5%)	201 (28.8%)	163 (23.3%)	3.42	1.23
VLS14	I choose household furnishings because I like: their colours or how they look like.	86 (12.3%)	234 (33.5%)	154 (22.0%)	128 (18.3%)	97 (13.9%)	2.88	1.25
VLS15	My first memory is when I: look at something.	23 (3.3%)	77 (11.0%)	167 (23.9%)	260 (37.2%)	172 (24.6%)	3.69	1.06
VLS16	When I'm anxious, I: visualise the worst-case scenarios.	21 (3.0%)	132 (18.9%)	205 (29.3%)	218 (31.2%)	123 (17.6%)	3.41	1.07
VLS17	I feel especially connected to other people because of: how they look.	64 (9.2%)	207 (29.6%)	164 (23.5%)	140 (20.0%)	124 (17.7%)	3.08	1.25
VLS18	When I have to revise for an exam, I generally: write lots of revision notes or diagrams.	6 (0.9%)	41 (5.9%)	108 (15.5%)	210 (30.0%)	334 (47.8%)	4.18	0.96
VLS19	If I am explaining to someone, I tend to: show them what I mean.	83 (11.9%)	179 (25.6%)	178 (25.5%)	150 (21.5%)	109 (15.6%)	3.03	1.25

Table 4.18 (continued)

VLS20	I really love: watching films, photography, people or looking at art.	32 (4.6%)	121 (17.3%)	197 (28.2%)	203 (29.0%)	146 (20.9%)	3.44	1.14
VLS21	Most of my free time is spent: watching television.	19 (2.7%)	118 (16.9%)	154 (22.0%)	169 (24.2%)	239 (34.2%)	3.70	1.18
VLS22	When I first contact a person, I: arrange a face-to-face meeting.	26 (3.7%)	174 (24.9%)	180 (25.8%)	165 (23.6%)	154 (22.0%)	3.35	1.18
VLS23	I first notice how people: look or dress.	53 (7.6%)	157 (22.5%)	164 (23.5%)	201 (28.8%)	124 (17.7%)	3.27	1.21
VLS24	If I am angry, I tend to: keep replaying in my mind what it is that has upset me.	33 (4.7%)	152 (21.7%)	185 (26.5%)	189 (27.0%)	140 (20.0%)	3.36	1.16
VLS25	I find it easiest to remember: faces.	199 (28.5%)	236 (33.8%)	112 (16.0%)	86 (12.3%)	66 (9.4%)	2.40	1.28
VLS26	I think I can tell if someone is lying if: he/ she avoids looking at you.	19 (2.7%)	94 (13.4%)	160 (22.9%)	190 (27.2%)	236 (33.8%)	3.76	1.14
VLS27	When I meet an old friend: I say "It's great to see you!"	42 (6.0%)	200 (28.6%)	164 (23.5%)	166 (23.7%)	127 (18.2%)	3.19	1.21

Table 4. 18 (Continued)

VLS28	I remember things best by: writing notes or keeping printed details.	93 (13.3%)	193 (27.6%)	102 (14.6%)	112 (16.0%)	199 (28.5%)	3.19	1.44
VLS29	If I have to complain about faulty goods, I am most comfortable: writing a letter.	17 (2.4%)	104 (14.9%)	166 (23.7%)	215 (30.8%)	197 (28.2%)	3.67	1.11
VLS30	I tend to say: I see what you mean.	105 (15.0%)	166 (23.7%)	135 (19.3%)	169 (24.2%)	124 (17.7%)	3.06	1.34

Note. VLS: Visual learning style (*M* = 3.31, *SD* = 0.53). 1: Never; 2: Sometimes; 3: Often; 4: Usually; 5: Always.

Descriptive analysis for auditory learning style is presented in Table 4. 19, it suggests that most the undergraduates really love listening to music, the radio or talking to friends (*M* = 3.94, *SD* = 1.10); but they hardly ever listening to music or talking to friends during their free time (*M* = 1.65, *SD* = 0.88).

Table 4.19: Descriptive Statistics for Auditory Learning Style (*n* = 699)

Questionnaire Item		1	2	3	4	5	Mean	SD
ALS1	When I operate new equipment, I generally: listen to an explanation from someone who has used it before.	27 (3.9%)	274 (39.2%)	117 (16.7%)	177 (25.3%)	104 (14.9%)	3.08	1.18
ALS2	When I need directions for travelling, I: ask for spoken directions.	77 (11.0%)	196 (28.0 %)	145 (20.7%)	160 (22.9%)	121 (17.3%)	3.07	1.28
ALS3	When I cook a new dish, I like to: call a friend for explanation.	79 (11.3%)	196 (28.0%)	148 (21.2%)	183 (26.2%)	93 (13.3%)	3.02	1.24

Table 4. 19 (Continued)

ALS4	When I operate new equipment, I generally: give them a verbal explanation.	88 (12.6%)	259 (37.1%)	160 (22.9%)	137 (19.6%)	55 (7.9%)	2.73	1.15
ALS5	During my free time, I most enjoy: listening to music or talking to my friends.	374 (53.5%)	243 (34.8%)	44 (6.3%)	27 (3.9%)	11 (1.6%)	1.65	0.88
ALS6	I tend to say: listen to me explain.	97 (13.9%)	294 (42.1%)	161 (23.0%)	107 (15.3%)	40 (5.7%)	2.57	1.08
ALS7	When I go shopping for clothes, I tend to: discuss with the shop staff.	38 (5.4%)	150 (21.5%)	186 (26.6%)	163 (23.3%)	162 (23.2%)	3.37	1.21
ALS8	When I choose to go for a holiday, I usually: listen to recommendations from friends.	112 (16.0%)	264 (37.8%)	138 (19.7%)	114 (16.3%)	71 (10.2%)	2.67	1.22
ALS9	If I buy a new car, I would: discuss what I need with my friends.	60 (8.6%)	180 (25.8%)	159 (22.7%)	176 (25.2%)	124 (17.7%)	3.18	1.24
ALS10	When I am learning a new skill, I am most comfortable: talking through with the teacher exactly what I'm supposed to do.	10 (1.4%)	67 (9.6%)	185 (26.5%)	255 (36.5%)	182 (26.0%)	3.76	0.99
ALS11	If I am choosing food off a menu, I tend to: talk about the options in my head or with my partner.	51 (7.3%)	186 (26.6%)	168 (24.0%)	162 (23.2%)	132 (18.9%)	3.20	1.23
ALS12	When I listen to a band, I can't help: listening to the lyrics or the beats.	61 (8.7%)	181 (25.9%)	178 (25.5%)	171 (24.5%)	108 (15.5%)	3.12	1.21

Table 4. 19 (Continued)

ALS13	When I concentrate, I most often: discuss the problem or the possible solutions in my head.	6 (0.9%)	72 (10.3%)	166 (23.7%)	278 (39.8%)	177 (25.3%)	3.78	0.97
ALS14	I choose household furnishings because I like: the descriptions that the sales-people give me.	17 (2.4%)	69 (9.9%)	153 (21.9%)	277 (39.6%)	183 (26.2%)	3.77	1.02
ALS15	My first memory is when I: speak to someone.	28 (4.0%)	107 (15.3%)	186 (26.6%)	135 (33.6%)	143 (20.5%)	3.51	1.10
ALS16	When I'm anxious, I: talk over in my head what worries me most.	35 (5.0%)	161 (23.0%)	149 (21.3%)	180 (25.8%)	174 (24.9%)	3.42	1.23
ALS17	I feel especially connected to other people because of: what they say to me.	82 (11.7%)	247 (35.3%)	169 (24.2%)	137 (29.6%)	64 (9.2%)	2.79	1.16
ALS18	When I have to revise for an exam, I generally: talk over my notes alone or with other people.	32 (4.6%)	165 (23.6%)	145 (20.7%)	172 (24.6%)	185 (26.5%)	3.45	1.26
ALS19	If I am explaining to someone, I tend to: explain to them in different ways until they understand.	7 (1.0%)	81 (11.6%)	179 (25.6%)	262 (37.5%)	170 (24.3%)	3.73	0.99
ALS20	I really love: listening to music, the radio or talking to friends.	12 (1.7%)	79 (11.3%)	139 (19.9%)	178 (25.5%)	291 (41.6%)	3.94	1.10

Table 4. 19(continued)

ALS21	Most of my free time is spent: talking to friends.	28 (4.0%)	184 (26.3%)	129 (18.5%)	158 (22.6%)	200 (28.6%)	3.45	1.26
ALS22	When I first contact a person, I: talk to them on the telephone.	59 (8.4%)	253 (36.2%)	156 (22.3%)	138 (19.7%)	93 (13.3%)	2.93	1.19
ALS23	I first notice how people: sound or speak.	12 (1.7%)	103 (14.7%)	148 (21.2%)	211 (30.2%)	225 (32.2%)	3.76	1.11
ALS24	If I am angry, I tend to: raise my voice or tell people how I feel.	19 (2.7%)	136 (19.5%)	161 (23.0%)	205 (29.3%)	178 (25.5%)	3.55	1.15
ALS25	I find it easiest to remember: names.	16 (2.3%)	112 (16.0%)	133 (19.0%)	187 (26.8%)	251 (35.9%)	3.78	1.16
ALS26	I think I can tell if someone is lying if: his/ her voice changes.	13 (1.9%)	134 (19.2%)	160 (22.9%)	232 (33.2%)	160 (22.9%)	3.56	1.10
ALS27	When I meet an old friend: I say "It's great to hear from you!"	24 (3.4%)	100 (14.3%)	160 (22.9%)	219 (31.3%)	196 (28.0%)	3.66	1.31
ALS28	I remember things best by: saying them aloud or repeating key points in my head.	20 (2.9%)	104 (24.9%)	172 (24.6%)	195 (27.9%)	208 (29.8%)	3.67	1.14
ALS29	If I have to complain about faulty goods, I am most comfortable: complaining over the phone.	207 (29.6%)	209 (29.9%)	119 (17.0%)	103 (14.7%)	61 (8.7%)	2.43	1.29
ALS30	I tend to say: I hear what you are saying.	23 (3.3%)	139 (19.9%)	205 (29.3%)	210 (30.0%)	122 (17.5%)	3.38	1.09

Note. ALS: Auditory learning style (M = 3.27, SD = 0.55). 1: Never; 2: Sometimes; 3: Often; 4: Usually; 5: Always.

The undergraduates' KLS is statistically described in Table 4.20. The results show that the undergraduates usually participate in sporting activities,

eating foods, or dancing (M = 4.26, SD = 0.90) rather than going shopping for clothes and try the clothes on (M = 1.82, SD = 0.95).

Table 4.20**:** Descriptive Statistics for Kinaesthetic Leaning Style (n = 699)

Questionnaire Item		1	2	3	4	5	Mean	SD
KLS1	When I operate new equipment, I generally: go ahead and do; I figure it out as I use.	14 (2.0%)	181 (25.9%)	185 (26.5%)	225 (32.2%)	94 (13.4%)	3.29	1.06
KLS2	When I need directions for travelling, I: follow instincts or use a compass.	21 (3.0%)	140 (20.0%)	178 (25.5%)	211 (30.2%)	149 (21.3%)	3.47	1.12
KLS3	When I cook a new dish, I like to: follow instincts, tasting as I cook.	166 (23.7%)	211 (30.2%)	132 (18.9%)	124 (17.7%)	66 (9.4%)	2.59	1.28
KLS4	When I operate new equipment, I generally: demonstrate first and then let them do.	4 (0.6%)	42 (6.0%)	146 (20.9%)	281 (40.2%)	226 (32.3%)	3.98	0.91
KLS5	During my free time, I most enjoy: playing sport or doing DIY (do it yourself).	4 (0.6%)	43 (6.2%)	103 (14.7%)	221 (31.6%)	328 (46.9%)	4.18	0.94
KLS6	I tend to say: you try out.	33 (4.7%)	202 (28.9%)	182 (26.0%)	186 (26.6%)	96 (13.7%)	3.16	1.13

Table 4. 20 (continued)

KLS7	When I go shopping for clothes, I tend to: try the clothes on or test them out.	313 (44.8%)	263 (37.6%)	71 (10.2%)	40 (5.7%)	12 (1.7%)	1.82	0.95
KLS8	When I choose to go for a holiday, I usually: imagine what it would be like to be there.	23 (3.3%)	104 (14.9%)	181 (25.9%)	245 (35.1%)	146 (20.9%)	3.55	1.08
KLS9	If I buy a new car, I would: test-drive lots of different types of cars.	59 (8.4%)	125 (17.9%)	177 (25.3%)	216 (30.9%)	122 (17.5%)	3.31	1.20
KLS10	When I am learning a new skill, I am most comfortable: giving it a try myself and work it out as I go.	14 (2.0%)	149 (21.3%)	202 (28.9%)	216 (30.9%)	118 (16.9%)	3.39	1.06
KLS11:	If I am choosing food off a menu, I tend to: imagine what the food will taste like.	30 (4.3%)	123 (17.6%)	184 (26.3%)	208 (29.8%)	154 (22.0%)	3.48	1.14
KLS12:	When I listen to a band, I can't help: moving in time with the music.	38 (5.4%)	118 (16.9%)	148 (21.2%)	208 (29.8%)	187 (26.8%)	3.56	1.20

Table 4. 20 (continued)

KLS13	When I concentrate, I most often: move around a lot, fiddle with pens or pencils.	9 (1.3%)	102 (14.6%)	211 (30.2%)	220 (31.5%)	157 (22.5%)	3.59	1.03
KLS14	I choose household furnishings because I like: their textures and what it feels like to touch them.	75 (10.7%)	253 (36.2%)	219 (31.3%)	114 (16.3%)	38 (5.4%)	2.70	1.04
KLS15	My first memory is when I: do something.	26 (3.7%)	128 (18.3%)	223 (31.9%)	218 (31.2%)	104 (14.9%)	3.35	1.06
KLS16	When I'm anxious, I: can't sit still, fiddle or move around constantly.	13 (1.9%)	119 (17.0%)	168 (24.0%)	225 (32.2%)	174 (24.9%)	3.61	1.09
KLS17	I feel especially connected to other people because of: how they make me feel.	15 (2.1%)	80 (11.4%)	157 (22.5%)	250 (35.8%)	197 (28.2%)	3.76	1.05
KLS18	When I have to revise for an exam, I generally: imagine making the movement or creating the formulas.	51 (7.3%)	169 (24.2%)	164 (23.4%)	178 (25.5%)	137 (19.6%)	3.26	1.23

Table 4. 20 (continued)

KLS19	If I am explaining to someone, I tend to: encourage them to try or talk them through my idea as they do it.	4 (0.6%)	58 (8.3%)	186 (26.6%)	239 (34.2%)	212 (30.3%)	3.85	0.97
KLS20	I really love: taking part in sporting activities, eating foods or dancing.	2 (0.3%)	34 (4.9%)	104 (14.9%)	200 (28.6%)	359 (51.4%)	4.26	0.90
KLS21	Most of my free time is spent: doing physical activity or making things.	10 (1.4%)	134 (19.2%)	172 (24.6%)	210 (30.0%)	173 (24.7%)	3.58	1.10
KLS23	I first notice how people: stand or move.	6 (0.9%)	81 (11.6%)	169 (24.2%)	250 (35.8%)	193 (27.6%)	3.78	1.01
KLS24	If I am angry, I tend to: stamp about, slam doors or physically demonstrate my anger.	82 (11.7%)	229 (32.8%)	172 (24.6%)	127 (18.2%)	89 (12.7%)	2.87	1.21
KLS25	I find it easiest to remember: things I have done.	60 (8.6%)	269 (38.5%)	193 (27.6%)	100 (14.3%)	77 (11.0%)	2.81	1.13
KLS26	I think I can tell if someone is lying if: he/ she give you funny vibes.	26 (2.7%)	164 (23.5%)	184 (26.3%)	208 (29.8%)	117 (16.7%)	3.32	1.12

Table 4. 20 (continued)

KLS27	When I meet an old friend: I give them a hug or a handshake.	41 (5.9%)	151 (21.6%)	221 (31.6%)	173 (24.7%)	113 (16.2%)	3.24	1.14
KLS28	I remember things best by: doing or practising the activity or imagining it being done.	31 (4.4%)	125 (17.9%)	186 (26.6%)	198 (28.3%)	159 (22.7%)	3.47	1.15
KLS29	If I have to complain about faulty goods, I am most comfortable: taking the item back to the store or posting it to head office.	106 (15.2%)	183 (26.2%)	154 (22.0%)	144 (20.6%)	112 (16.0%)	2.96	1.31
KLS30	I tend to say: I know how you feel.	43 (6.2%)	184 (26.3%)	198 (28.3%)	192 (27.5%)	82 (11.7%)	3.12	1.13

Note. KLS: Kinaesthetic learning style (M = 3.35, SD = 0.52). 1: Never; 2: Sometimes; 3: Often; 4: Usually; 5: Always.

Generally, the results demonstrate that the undergraduates possess similar preference, with marginal mean scores, towards the three LS: Kinaesthetic (M = 3.35, SD = 0.52), visual (M = 3.31, SD = 0.53) and auditory (M = 3.27, SD = 0.55) LS.

Table 4.21: Descriptive Statistics for Learning Styles (LS) (n = 699)

Variables	Mean	Std Dev.
Visual Learning Style	3.31	0.53
Auditory Learning Style	3.27	0.55
Kinaesthetic Learning Style	3.35	0.52

4.4 Inferential Data Analysis

Hierarchical Multiple Regression was employed to assess the ability of PE, EE, SI, AG and LS to predict the BI to use technology. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

4.4.1 Hierarchical Multiple Regression

Objective 1: To Examine the Antecedents that Influence Undergraduates' Behavioural Intention to Use Technology through the UTAUT Model

RQ 1: (a) How much variance in behavioural intention can be explained by achievement goals and learning styles after controlling performance expectancy, effort expectancy and social influence?

As shown in Table 4.22, PE, EE and SI were entered at Step 1, explaining 32.8% (R Square = .328) of the variance in BI in the UTAUT model. After the entry of AG and LS at Step 2, the variance explained by the model as a whole was 35% (R Square = .350).

Table 4.22 also demonstrates that AG and LS explained an additional 2.2 % of the variance in BI after controlling PE, EE and SI, R squared change = .022, F change (2, 693) = 11.61, $p < .0005$.

Table 4.22

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.573[a]	.328	.326	.82642	.328	113.311	3	695	.000
2	.592[b]	.350	.346	.81408	.022	11.612	2	693	.000

a. Predictors: (Constant), SI, PE, EE

b. Predictors: (Constant), SI, PE, EE, LS, AG

c. Dependent Variable: BI

Table 4.23 shows that the regression of PE, EE, SI, AG and LS generate a significant effect for BI, F (5, 693) = 74.71, $p < .0005$.

Table 4.23

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	232.165	3	77.388	113.311	.000[b]
	Residual	474.665	695	.683		
	Total	706.830	698			
2	Regression	247.556	5	49.511	74.708	.000[c]
	Residual	459.274	693	.663		
	Total	706.830	698			

a. Dependent Variable: BI

b. Predictors: (Constant), SI, PE, EE

c. Predictors: (Constant), SI, PE, EE, LS, AG

RQ 1: (b) Which is the best predictor of behavioural intention: performance expectancy, effort expectancy, social influence, achievement goals or learning styles?

Besides, four out of five of the antecedents of BI showed statistically significance. Results yielded in Table 4.24 indicates that EE (β = .32, $p < .0005$) is the strongest predictor of BI, followed by PE (β = .19, $p < .0005$), AG (β = .16, $p < .0005$) and SI (β = .08, $p < .05$). The results also revealed that LS (β = .02, $p = .658$) was not a statistically significant predictor of BI in this study.

Table 4.24

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.921	.222		8.641	.000
	PE	.254	.044	.231	5.803	.000
	EE	.345	.041	.340	8.364	.000
	SI	.124	.038	.114	3.307	.001
2	(Constant)	1.431	.272		5.257	.000
	PE	.209	.044	.189	4.721	.000
	EE	.327	.041	.322	7.991	.000
	SI	.087	.038	.080	2.309	.021
	AG	.175	.039	.159	4.506	.000
	LS	.031	.069	.015	.443	.658

a. Dependent Variable: BI

4.4.2 T-test

Objective 2: To Determine whether there is a Significant Difference between Arts and Science Undergraduates' Technology Use

RQ 2: Is there a significant difference in the mean scores of technology use across the undergraduates' FOS (Arts and Science)?

An independent-samples t-test was conducted to compare the mean scores of technology use for FAS and FSc undergraduates. The mean score of FSc (M = 5.93, SD = .779) is slightly higher than the score of FAS (M = 5.87, SD = .811). However, there was no significant difference in technology use between the two groups of undergraduates, t (697) = .888, p = .375.

Table 4.25: Independent T-test for Technology Use Scores

	Faculty	n	Mean	Std. Deviation
Technology Use	FSc	311	5.9283	.7793
	FAS	388	5.8744	.8111

Table 4.26: Equality of Means for Technology Use Scores

		Levene's Test for Equality of Variance		t-test for Equality of Means			
		F	Sig.	Sig.	t	df	Sig. (2-tailed)
Technology Use	Equal variances assumed	.417	.519	.519	.888	697	.375
	Equal variances not assumed				.892	674.623	.373

* $p < .05$.

According to Cohen's d. Eta squared, it was stated that the formula is able to calculate the effect size and variance in the dependent variable by the

independent variables in a t-test (Pallant, 2013). The formula proposed by Cohen is shown as follows:

$$\text{Eta squared} = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

$$= \frac{(0.888)^2}{(0.888)^2+(388+311-2)}$$

$$= 0.001$$

Hence, by replacing the appropriate value obtained in the results, the effect size for the independent-samples t-test is calculated. As a result, the magnitude of the differences in the means (mean difference = .054, 95%) was very small (eta squared = .1), whereby only 0.1% of the variance in technology use is explained by FOS which elucidates clearly that there is no significant difference in the mean scores between Arts and Science undergraduates.

4.5 The Hypotheses and Results

The first hypothesis proposes that the PE has a significant influence on the undergraduates' BI. Based on the results, the undergraduates' PE ($\beta = .19$, $p < .0005$) has a significant influence on BI. Hence, H1 is supported.

In the second hypothesis, it is hypothesised that EE has a significant influence on the undergraduates' BI. According to the results, BI is significantly influenced by EE ($\beta = .32$, $p < .0005$), supporting H2.

The third hypothesis postulates that SI has a significant influence on BI. Based on the results obtained, SI ($\beta = .08$, $p = .021$) has significant influence on BI. Thus, H3 is supported.

H4 has hypothesised that the undergraduates' AG influences their BI to use technology. According to the results, AG ($\beta = .16$, $p < .0005$) is a significant predictor that influences the undergraduates' BI to use technology. So, H4 is supported.

H5 postulates that LS has a significant influence on BI. However, based on the results yielded, LS ($\beta = .015$, $p = .658$) has no significant influence on BI. Therefore, H5 is not supported.

According to Hypothesis 6, PE is hypothesised to be the best predictor of BI. However, the result shows that EE ($\beta = .32$, $p < .0005$) is the strongest predictor of BI, followed by PE ($\beta = .19$, $p < .0005$), AG ($\beta = .16$, $p < .0005$) and SI ($\beta = .08$, $p < .05$).

The last hypothesis proposes that there is a significant difference between Arts and Science undergraduates' technology use. Nevertheless, the result indicates non-significant difference t (697) = .888, $p = .375$ (two-tailed)

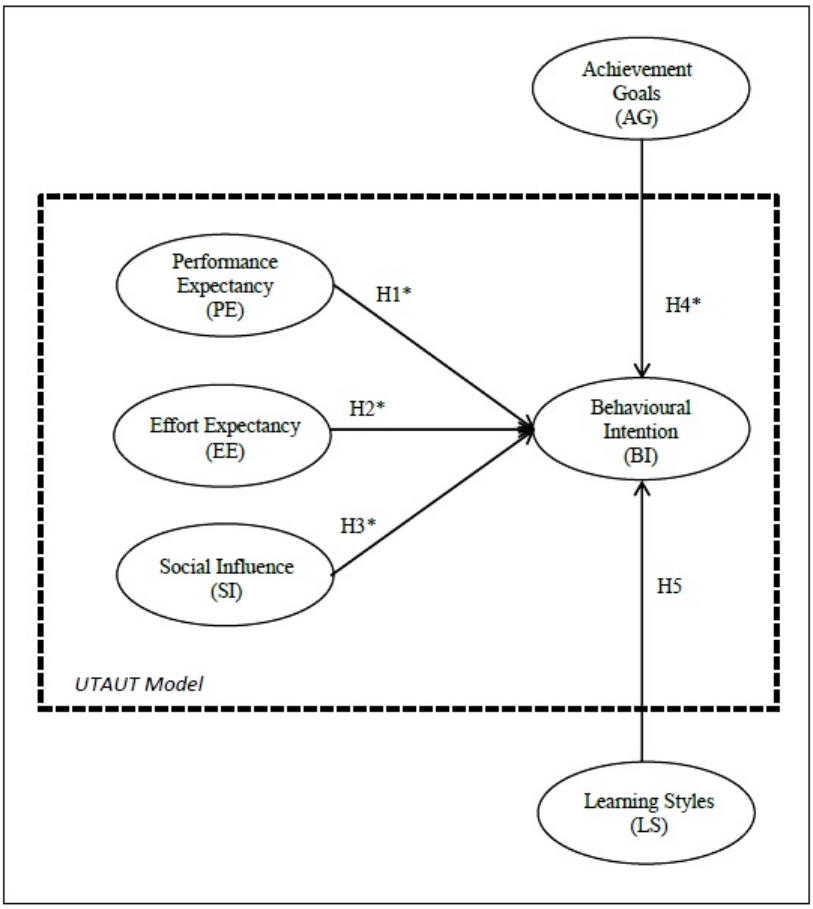
of undergraduates' technology use across their FOS. Therefore, H7 is not supported.

Table 4.27 and Figure 4.1 demonstrate the summarised results yielded based on the hypotheses proposed in this study. H1, H2, H3 and H4 are supported by the statistical results. On the other hand, H5, H6 and H7 are not supported by the statistical results in this study.

Table 4.27: Summary of Results

Hypothesis	Description	*P*-value	Result
H1	PE → BI	.000*	Supported
H2	EE → BI	.000*	Supported
H3	SI → BI	.021*	Supported
H4	AG → BI	.000*	Supported
H5	LS → BI	.658	Not Supported
H6	PE: The best predictor	.019	Not Supported
H7	FOS & Technology Use	.375	Not supported

* $p < .05$



$p < .05$

Figure 4.1: Final Research Model for Undergraduates' Behavioural Intention to Use Technology

4.6 Conclusion

In conclusion, Chapter 4 has examined the results obtained in this study. The results have been presented with statistics and tables corresponding to the research objectives and research questions. Overall, four out of seven of the hypotheses were supported. Further discussions on the results presented in this chapter will be explained in the next chapter.

CHAPTER 5

DISCUSSION

5.1 Introduction

The preceding chapter presented the results of this study. Chapter 5 provides a summary of the study and discussions of the findings obtained from the results analysed, followed by the conclusion, implications and recommendations for future studies.

5.2 Summary of the Study

This dissertation presents the study of the undergraduates' BI to use technology in Malaysia via the UTAUT model. The model was developed by Venkatesh et al. (2003), integrating eight existing technology acceptance and use models. The UTAUT model has been widely adopted, adapted and applied in a multitude of research disciplines across the globe. Nevertheless, to the best of the researcher's knowledge, limited studies have been conducted using the UTAUT model with the integration of AG and LS in the Malaysian higher education context.

The hypotheses of this study were developed as follows:

H1: Performance expectancy will have a significant influence on the undergraduates' behavioural intention.

H2: Effort expectancy will have a significant influence on the undergraduates' behavioural intention.

H3: Social influence will have a significant influence on the undergraduates' behavioural intention.

H4: Achievement goals will have a significant influence on the undergraduates' behavioural intention to use technology.

H5: Learning styles will have a significant influence on the undergraduates' behavioural intention to use technology.

H6: The best predictor of the undergraduates' behavioural intention to use technology is performance expectancy.

H7: There will be a significant difference between Arts and Science undergraduates' technology use behaviour.

This study was carried out to investigate the undergraduates' BI to use technology through the UTAUT model with two additional variables namely AG and LS. Besides, this study also examined whether there is any significant difference between Arts and Science undergraduates' technology use. The instrumentation employed for the data collection included the UTAUT model Questionnaire, AGQ-R, and VAK LS Questionnaire, with a total of 127 operationalised items to fit the context of this study. A pilot test was conducted prior to the actual test and the results proved the selected instruments were reliable. All constructs in the actual test questionnaire indicated high reliability

with Cronbach's Alpha values above .90. Meanwhile, the instrument was reviewed for content validity by two experts.

The investigations conducted in the present study included a series of descriptive analyses to provide a more detailed understanding towards the respondents and their responses towards each item in the questionnaire. In addition, with the statistical significance level set at .05, the HMR technique was employed to analyse the data collected from 699 FAS and FSc undergraduates from UTAR. Furthermore, the undergraduates' technology use was compared across their FOS through independent-samples t-test via SPSS.

Overall, the hypothesis tests showed that out of the seven hypotheses, four were supported by the results yielded, while H5, H6 and H7 were not accepted. As a result, a number of conclusions can be drawn related to the hypotheses and these shall be discussed in the following section.

5.3 Discussion

5.3.1 Objective 1: To Examine the Antecedents that Influence Undergraduates' Behavioural Intention to Use through the UTAUT Model

In general, the UTAUT model fits this study well as all the original antecedents in the original UTAUT model are statistically significant. PE, EE and SI are significant antecedents that affect the undergraduates' BI to use technology in this study. On the other hand, AG is the only one additional

variable that shows statistical significance in predicting BI. These findings will be discussed further in the following sections.

5.3.1.1 Hypothesis 1: Performance Efficacy will have Significant Influence on Undergraduates' Behavioural Intention to Use Technology

Based on the study outcomes, PE is a significant predictor that impacts the undergraduates' BI. According to Lin et al. (2013b), PE has been consistently proven as a strong predictor of BI. Hence, this result is in line with many previous studies such as Al-Gahtani et al. (2007), Bandyopadhyay and Fraccastoro (2007), Cruz et al. (2014), Decman (2015), Dulle & Minishi-Majanja (2011), Im et al. (2011), Nassuora (2012), Raman et al. (2014), and Wang and Shih (2009). Therefore, these studies further confirm the finding in this study that PE has a significant influence on the undergraduates' intention to use technology as they believed technology is a useful tool to improve their studies and academic achievement, as well as tasks completion and productivity.

This is probably due to conveniences that technology has brought about to humans, from daily routines to education implications. Technology permits students, especially undergraduates who are able to operate and have access to technology, to reach out to wider access of rich resources and perform multitasking. Thus, the undergraduates can expect higher performance efficiency by integrating technology throughout their learning process. This is a positive phenomenon as the undergraduates have identified the growing

potential of technology in transforming learning into a more engaging and active process.

5.3.1.2 Hypothesis 2: Effort Efficacy will have Significant Influence on Undergraduates' Behavioural Intention to Use Technology

EE is a significant determinant that influences the undergraduates' BI. This finding is consistent with the findings reported in the previous studies such as Bandyopadhyay and Fraccastoro (2007), Birch and Irvine (2009), Cruz et al. (2014), Dulle and Minishi-Majanja (2011), Im et al. (2011), Jairak et al. (2009), Lin et al. (2013b), Mtebe and Raisamo (2014), Nassuora (2012), and Wang and Shih (2009).

Surprisingly, EE stands out as the strongest predictor of BI, while PE was commonly the most robust predictor in the literature. This is probably because the undergraduates in the current study were confident and skilful in using and operating technology. So, they did not require laborious effort in using technology. This implies that the undergraduates in Malaysia are becoming more technology-savvy as they grow up alongside technology development which evolutes globally (Babic, 2012). Moreover, the ubiquity of modern technology such as smartphones, tablets and laptops consolidates their familiarity with technology and use them for academic purpose (Jeng, Wu, Huang, Tan, & Yang, 2010; Thomas et al., 2013). Hence, there is no doubt that educational technology utilisation is welcomed as the undergraduates have already embraced technology with confidence.

5.3.1.3 Hypothesis 3: Social Influence will have Significant Influence on Undergraduates' Behavioural Intention to Use Technology

In this study, SI is a significant determinant that influences the undergraduates' BI. This finding reaches a consensus with several previous studies which also indicate SI as a predictor of BI (Bandyopadhyay & Fraccastoro 2007; Im et al. 2011; Jairak et al., 2009; Raman et al., 2014; Tan 2013; Wang & Shih, 2009).

This finding entails that the important people in the undergraduates' life play an imperative role in their technology utilisation. The undergraduates use technology because people whom they perceived important, such as lecturers, were supportive and encouraging on their use of technology. In other words, the undergraduates' intention to use technology is influenced by important people around them and may be affected by others' perception.

5.3.1.4 Hypothesis 4: Achievement Goals will have Significant Influence on Undergraduates' Behavioural Intention to Use Technology

In addition to existing determinants in the original UTAUT model, the additional variable AG in this study also established significant influence on undergraduates' BI to use technology. This finding is in line with Wang et al.'s (2016) which suggested that AG predict the likelihood of BI. Wang et al. (2016) also explained that the greater the students' AG goals, the greater their

intention to perform actions. Hence, this finding implies that both the undergraduates' mastery and performance goals are important in their technology utilisation intention, especially for academic purpose.

The undergraduates are most likely to use technology to boost mastery towards the content of course materials and to avoid learning less than they are possible to. Therefore, the intention to use technology among the undergraduates' is considered intrapersonal-oriented as they intend to use technology for personal attainment instead of for the sake of completing a task. Moreover, mastery goals enable the undergraduates to possess higher self-confidence and belief for self-development (Bulus, 2011). Hence, as undergraduates possess mastery goals, they show great positive behaviours towards learning, and have much confidence and motivation to utilise technology as a useful tool to develop and pursue interest in learning.

Besides, this finding also implies that the undergraduates' technology use intention is performance-oriented. Performance goals are important factors that influence the undergraduates' intention to use technology. This is most likely because technology is perceived as a useful tool that can boost their academic performance by improving their learning processes. It entails that the undergraduates who intend to use technology do so because they are likely to gain or avoid judgement towards their performance (Elliot & Church, 2008; Goraya & Hasan, 2012).

5.3.1.5 Hypothesis 5: Learning Styles will have Significant Influence on Undergraduates' Behavioural Intention to Use Technology

In this study, the finding indicates that LS do not influence undergraduates' BI to use technology. This finding contradicts many of the previous studies such as Balakrishnan and Gan (2016), Chang et al. (2015), Cruz et al. (2014), Elkaseh et al. (2014), Huang (2015), Lin et al. (2013b), Naimie et al. (2013), Park (2009) and Seyal and Rahman (2015).

This finding suggests that an individual's preferred learning mode (Sternberg & Grigorenko, 2001) as well as cognitive behaviour and habits (Chang et al., 2015; Pritchard, 2009) in learning do not influence BI to use technology. Given that the respondents in this study are undergraduates, aged from 18 to 27 (see Table 4.6), they are the members of Generation Y who are generally considered to be technology-savvy and tend to be diverse in their learning stages and processes (Lynch et al., 2009). LS do not influence undergraduates' BI to use technology might be due to variations in their preferred learning modes and strategies. Besides, Lynch et al. (2009) also proposed the possibility that these individuals from the Generation Y are not using technology as learning tools and effective pedagogies, but mostly as social tools. Hence, it might also be because the undergraduates lack awareness on the usage of technology as effective learning tools.

5.3.1.6 Hypothesis 6: The Best Predictor of the Undergraduates' Behavioural Intention to Use Technology is Performance Expectancy

Besides PE, EE and SI in the original UTAUT, AG and LS were added into the UTAUT model as the predictors of undergraduates' BI to use technology. Among the four direct determinants PE, EE, SI and AG which found to have a significant influence on BI, EE was found to be the strongest predictor of undergraduates' BI to use technology.

In contrast to the literature which reported that PE is the strongest and most robust predictor of BI, the present study discovered that EE is the strongest antecedent that influences undergraduates' BI to use technology. Some of the past studies that found PE to be the strongest predictor of BI included Almatari et al. (2013), Jambulingam (2013), Lin et al. (2013), Mtebe and Raisamo (2014), and Teo and Noyes (2014).

However, the finding in this study is supported by Cruz et al. (2014). The research found that EE is the strongest predictor of BI as compared to PE and SI. According to Cruz et al. (2014), this finding suggests that the students are willing to invest the time to use technology as it does not require laborious effort. In line with the finding of the current study, Mtebe and Raisamo (2014) also reported that EE as a significant predictor of BI denotes that students are familiar with technology and believe that they do not need help use technology. It is most likely because they think it is simple and easy to use technology, and

they perceive themselves to be skilful enough in handling technology, hence the students are more likely to use technology.

5.3.2 Objective 2: To Determine whether there is a Significant Difference between Arts and Science Undergraduates' Technology Use

5.3.2.1 Hypothesis 7: There will be a Significant Difference between Arts and Science Undergraduates' Technology Use

Lastly, the findings also reveal that Arts and Science undergraduates use technology despite their academic discipline. This finding rejects the hypothesis which was designed based upon the findings of several previous studies (Collins, et al., 2012; Guirdy & BrckaLorenz, 2010).

Nonetheless, this finding supports the findings in past studies. Students were reported to use technology despite disciplinary differences (Buzzard et al., 2011; Wong & Cheung, 2012). The present study further confirms that Arts and Science undergraduates use technology notwithstanding their FOS in the Malaysian educational setting. This implies that contents, values and cultures between FOS do not impact the undergraduates' technology use.

Moreover, this is probably because of the similar learning environment in the university. The undergraduates might share similar values towards technology adoption as the educational structure, requirements and facilities are the same within a university.

5.4 Implications

This study contributes to the literature of the education system in Malaysia. It will add values to theoretical contributions due to the integration of three different theoretical perspectives, namely, the UTAUT model, AG and LS with contextual value. This study explored the UTAUT model by integrating 2 x 2 AG framework and VAK LS in order to capture a more comprehensive view towards the BI to use technology in a Malaysian tertiary education context.

This study also provides an exploration of the technology utilisation phenomenon among the undergraduates in Malaysia. Since technology integration in education and its utilisation in classrooms are becoming more prevalent alongside technological revolution, there is a need for Malaysians to keep abreast of its revolutionary impact on education. Undeniably, apparent implications of technology in education have brought about many advantages in the teaching-learning process, but whether or not technology adoption is truly effective for the undergraduates' learning, it is especially worth to investigate due to obvious diversity and individual differences in the Malaysian community.

Hence, this study will serve as a reference for the education policy makers and stakeholders including the Ministry of Education, Ministry of Higher Education, academic institutions, course designers, educators and students, to understand technology use from the undergraduates' point of view.

The needs of the undergraduates should be addressed explicitly across individual differences. So, pedagogical methodologies could be designed by considering the factors that lead to the undergraduates' technology use, specifically, their behavioural intention, learning styles and achievement goals.

In line with the educational goals, educators could identify the importance of adopting technology for pedagogical purpose. Policy makers could invest in elevating teachers' technology competencies by providing useful and practical training in order to educate teachers to fully utilise technology as a strong basis for consolidating educational technology enhancement.

5.5 Limitations of the Study

The findings in this study might be encouraging and useful, but there are several methodological limitations that shall not be overlooked. The results are not extensively generalizable because this study only examined the undergraduates' BI to use technology from two faculties within an institution in Malaysia. Therefore, it is not representative of the scenario in Malaysia.

HMR was employed to examine the undergraduates' BI to use technology through the UTAUT model with additional variables, namely AG and LS in this study. Simultaneous evaluation of model construct relationships may be limited using regression analyses.

Besides, the antecedents measured in this study are prone to change over time. The antecedent variables such as PE and EE may be different within an individual at different points of time and locations. Thus, the results and findings of this study may only provide an overview of students' BI to use technology on a particular phase of time.

Moreover, the data was collected through a self-administered questionnaire which was dependent on self-reported information. The respondents' honesty and data accuracy must be acknowledged due to potent responding errors and individual bias. Further, it might not be able to suggest an in-depth view to understand the actual use of technology among the undergraduates.

5.6 Recommendations for Future Studies

Methodologically, future researchers are encouraged to employ qualitative research methodology to obtain an in-depth view of the undergraduates' actual technology use. Besides, future researchers may improve the study by enlarging the scope of study by including data from diverse institutions and contexts in order to fit the actual setting in Malaysia.

Future studies may consider other potential analysis techniques such as Structural Equation Modelling (SEM) to better improve similar research. SEM allows complex variable relationships to be explained through less restrictive steps to establish a clearer idea of a model.

Theoretically, incorporating the three theoretical models may inspire future researchers to conduct similar studies using this incorporated UTAUT model in other contexts. Future studies could duplicate the current study with a different population across higher education in Malaysia or allow any possible predictors to be examined in this model.

This study contributes to a slightly better exploration of antecedents that influence undergraduates' BI to use technology by integrating additional variables namely AG and LS into the UTAUT model. However, in regards to the considerable percentage of the unexplained variance in BI to use technology in this study, prospect researchers could further explore potential relevant antecedents that influence undergraduates' BI to use technology in future research.

5.7 Conclusion

This chapter has detailed the important findings in this study:

(i) Performance expectancy, effort expectancy, social influence and achievement goals are significant antecedents that influence behavioural intention in the UTAUT model;

(ii) Achievement goals are significant predictors of behavioural intention to use technology;

(iii) Learning styles are not significant predictors of behavioural intention to use technology;

(iv) Effort expectancy is the best predictor of behavioural intention as compared to performance expectancy, social influence and achievement goals;

(v) There is no significant difference between Arts and Science undergraduates' technology use.

These findings could serve as a useful reference for everyone especially those who involve in the education system such as the educators, students and course designers. Teaching-learning methodologies could be improved and modified alongside technology advancement, catering to the learners' needs across individual differences with technology integration. Hence, learners could appreciate and adopt technology as a powerful tool to maximise information attainment and to regulate self-directed learning as an independent mature learner.

In summary, the objectives of this study have been achieved and four out of seven of the hypotheses have been supported. In this study, the undergraduates' performance expectancy, effort expectancy, social influence and achievement goals are significant determinants of the undergraduates' behavioural intention to use technology. This also implies that all the antecedents in the original UTAUT model are significant determinants in the present study. For the additional variables that are introduced in this study, achievement goals are proved to improve predictability of behavioural intention to use technology among undergraduates. Besides, this study found that both Arts and Science undergraduates use technology despite of their

academic discipline. Overall, the findings could help to enhance the understanding of the undergraduates' use of technology in a Malaysian higher education context.

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Appendix A

Request for Permission to Use the UTAUT Questionnaire

Request for permission to use UTAUT Questionnaire
3 messages

Tiny Tey <ttcyuen456@gmail.com> 9 July 2014 at 15:13
To: vvenkatesh@vvenkatesh.us

Dear Dr Venkatesh,

Greetings. My name is Tiny Tey Chiu Yuen. I'm a Master's degree student from Universiti Tunku Abdul Rahman (UTAR), Malaysia.

I am writing this email to ask for your permission to use Unified Theory of Acceptance and Use of Technology (UTAUT) Questionnaire items for my Master's degree research study and not for commercial purpose. Below are some details:

Field of study: Educational Technology
Title of research: An Extension of Unified Theory of Acceptance and Use of Technology (UTAUT) model: Exploring the antecedents of Students' Technology Use

Thank you very much and looking forward to hearing from you soon.

Regards,
Tiny Tey

Viswanath Venkatesh <vvenkatesh@vvenkatesh.us> 15 July 2014 at 15:33
To: Tiny Tey <ttcyuen456@gmail.com>

Thanks for your interest. I am sorry for the delayed response which is due to a hectic travel schedule.

You have my permission.

You will find related papers at: http://vvenkatesh.com/Downloads/Papers/fulltext/downloadpapers.htm

You may also find my book (that can be purchased for a significant student discount and faculty member discount) to be of use: http://vvenkatesh.com/book

Appendix B

Request for Permission to Use the 2x2 Achievement Goal Framework Questionnaire

Request for permission to use 2 x 2 Achievement Goal Framework items
11 messages

Tiny Tey <ttcyuen456@gmail.com> 9 July 2014 at 15:06
To: andye@psych.rochester.edu

Dear Professor Elliot,

Greetings. My name is Tiny Tey Chiu Yuen. I'm a Master's degree student from Universiti Tunku Abdul Rahman (UTAR), Malaysia.

I am writing this email to ask for your permission to use 2 x 2 Achievement Goal Framework items for my Master's degree research study and not for commercial purpose. Below are some details:

Field of study: Educational Technology
Title of research: An Extension of Unified Theory of Acceptance and Use of Technology (UTAUT) model: Exploring the antecedents of Students' Technology Use

Thank you very much and looking forward to hearing from you soon.

Regards,
Tiny Tey

Elliot, Andrew <andrew.elliot@rochester.edu> 9 July 2014 at 15:13
To: Tiny Tey <ttcyuen456@gmail.com>

You have may permission. I recommend using the attached format – it is designed to help students attend carefully to the items, which we think will reduce the PAP/PAV correlation.

Best,

Andrew

Appendix C

Request for Permission to Use the VAK Learning Styles Questionnaire

Request for permission to use VAK Learning Styles Self-Assessment Questionnaire
6 messages

Tiny Tey <ttcyuen456@gmail.com> 9 May 2014 at 23:36
To: ac@alanchapman.com

Dear Mr Chapman,

Greetings. My name is Tiny Tey Chiu Yuen. I'm a Master's degree student from Universiti Tunku Abdul Rahman (UTAR), Malaysia.

I am writing this email to ask for your permission to use VAK Learning Styles Self-Assessment Questionnaire for my Master's degree research study and not for commercial purpose. Below are some details:

Field of study: Educational Technology
Title of research: An Extension of Unified Theory of Acceptance and Use of Technology (UTAUT) model: Exploring the antecedents of Students' Technology Use

Thank you very much and hope to hear from you soon.

Regards,
Tiny Tey

alan chapman <ac@alanchapman.com> 9 May 2014 at 23:56
Reply-To: ac@alanchapman.com
To: Tiny Tey <ttcyuen456@gmail.com>

Tiny Tey this is ok and within st6andard terms of use for my website.

Best wishes for your studies and beyond.

Appendix D

Questionnaire

Exploring of the Antecedents of Students' Technology Use through UTAUT Model

The project seeks to examine the factors that influence the students' technology use through the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

There are THREE parts in this survey: Part A, Part B and Part C.

Your response and personal information are confidential. Your cooperation and honest responses are highly appreciated!

Age

_____

Gender
Tick (√) only one option.

☐ Male
☐ Female

Name of programme
E.g.: Bachelor of Arts (Hons) English Education

_____

Faculty
Tick (√) only one option.

☐ Faculty of Science (FSc)
☐ Faculty of Arts and Social Science (FAS)

GPA
May Semester 2014 result (E.g.: 2.33)

_____

CGPA
Your latest final examination result (E.g.:2.33)

_____

Academic Qualification (prior to Bachelor's Degree)
Tick (√) only one option.

- ☐ STPM
- ☐ Diploma
- ☐ Foundation
- ☐ A-level
- ☐ Other: _____

Part A: Tick (√) only ONE option for each of the following items.

PE1: Technology will be useful in my studies.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

PE2: Using technology will enable me to accomplish tasks more quickly.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

PE3: Using technology will increase my productivity.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

PE4: Using technology will increase my chances of getting better academic results.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

EE1: My interaction with technology would be understandable.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

EE2: It would be easy for me to become skilful at using technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

EE3: I would find technology easy to use.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

EE4: Learning to operate technology would be easy for me.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

SI1: People who influence my behaviour think that I should use technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

SI2: People who are important to me think that I should use technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

SI3: The management team of this university has been helpful in the use of technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

SI4: My lecturers have been supportive in the use of technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

SI5: My lecturers encourage the use of technology.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

BI1: I intend to use technology in the next few months.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

BI2: I predict I would use technology in the next few months.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

BI3: I plan to use technology in the next few months.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

BI4: I will use technology in the future.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

BI5: I plan to use technology often.

	1	2	3	4	5	6	7	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

UB1: I check my email.

	1	2	3	4	5	6	7	
Never	◯	◯	◯	◯	◯	◯	◯	Very often

UB2: I communicate via instant messaging.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB3: I use the Internet for course-related work.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB4: I use the computer for course-related work.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB5: I use the Internet for leisure.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB6: I use the computer for leisure.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB7: I use technology to communicate with others.

	1	2	3	4	5	6	7	
Never	○	○	○	○	○	○	○	Very often

UB8: Total hours per day I use technology (Write in the space provided below).
E.g.: 2.5

_____

Part B: Tick (√) only ONE option for each of the following items.
Consider what your goal(s) & aim(s) are and what you are trying to accomplish in your current programme.

Programme = e.g.: Bachelor of Arts (Hons) English Education
Goal = Achievement(s) that you attempt to accomplish in your current programme.
Aim = Achievement(s) that you attempt to accomplish this semester.

PAP1: My goal is to perform better than the other students in this programme.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAP1: My goal is to learn as much as possible in this programme.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

PAV1: My goal is to avoid performing poorly compared to others in this programme.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAV1: My goal is to avoid learning less than it is possible to learn in this programme.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

PAP2: My aim is to perform well relative to the other students this semester.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAP2: My aim is to completely master the material presented this semester.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

PAV2: My aim is to avoid doing worse than the other students this semester.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAV2: My aim is to avoid learning less than I possibly could this semester.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

PAP3: I am striving to do well compared to the other students.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAP3: I am striving to understand the content of this programme as thoroughly as possible.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

PAV3: I am striving to avoid performing worse than the others.

.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

MAV3: I am striving to avoid incomplete understanding of the course material.

	1	2	3	4	5	6	7	
Completely NOT true for me	◯	◯	◯	◯	◯	◯	◯	Extremely true for me

Part C: Tick (√) only ONE option for each statement in the following items.

Select the option that most represents how you generally behave.

LS1: When I operate new equipment, I generally:

	Never	Sometimes	Often	Usually	Always
read instruction first.	◯	◯	◯	◯	◯
listen to an explanation from someone who has used it before.	◯	◯	◯	◯	◯
go ahead and do; I figure it out as I use.	◯	◯	◯	◯	◯

LS2: When I need directions for travelling, I:

	Never	Sometimes	Often	Usually	Always
look at a map.	◯	◯	◯	◯	◯
ask for a spoken directions.	◯	◯	◯	◯	◯
follow instincts or use a compass.	◯	◯	◯	◯	◯

LS3: When I cook a new dish, I like to:

	Never	Sometimes	Often	Usually	Always
follow a written recipe.	◯	◯	◯	◯	◯
call a friend for explanation.	◯	◯	◯	◯	◯
follow instincts, testing as I cook.	◯	◯	◯	◯	◯

LS4: If I am teaching someone something new, I tend to:

	Never	Sometimes	Often	Usually	Always
write instructions down for them.	◯	◯	◯	◯	◯
give them a verbal explanation.	◯	◯	◯	◯	◯
demonstrate first and then let them do.	◯	◯	◯	◯	◯

LS5: During my free time, I most enjoy:

	Never	Sometimes	Often	Usually	Always
going to museums or galleries.	◯	◯	◯	◯	◯
listening to music or talking to my friends.	◯	◯	◯	◯	◯
playing sport or doing DIY (do it yourself).	◯	◯	◯	◯	◯

LS6: I tend to say:

	Never	Sometimes	Often	Usually	Always
watch how I do.	◯	◯	◯	◯	◯
listen to me explain.	◯	◯	◯	◯	◯
you try out.	◯	◯	◯	◯	◯

LS7: When I go shopping for clothes, I tend to:

	Never	Sometimes	Often	Usually	Always
imagine what they would look like on.	◯	◯	◯	◯	◯
discuss with the shop staff.	◯	◯	◯	◯	◯
try the clothes on or test them out.	◯	◯	◯	◯	◯

LS8: When I choose to go for a holiday, I usually:

	Never	Sometimes	Often	Usually	Always
read lots of brochures.	◯	◯	◯	◯	◯
listen to recommendations from friends.	◯	◯	◯	◯	◯
imagine what it would be like to be there.	◯	◯	◯	◯	◯

LS9: If I buy a new car, I would:

	Never	Sometimes	Often	Usually	Always
read reviews in newspapers or magazines.	◯	◯	◯	◯	◯
discuss what I need with my friends.	◯	◯	◯	◯	◯
test-drive lots of different types of cars.	◯	◯	◯	◯	◯

LS10: When I am learning a new skill, I am most comfortable:

	Never	Sometimes	Often	Usually	Always
watching what the teacher is doing.	⬭	⬭	⬭	⬭	⬭
talking through with the teacher exactly what I'm supposed to do.	⬭	⬭	⬭	⬭	⬭
giving it a try myself and work it out as I go.	⬭	⬭	⬭	⬭	⬭

LS11: If I am choosing food off a menu, I tend to:

	Never	Sometimes	Often	Usually	Always
imagine what the food will look like.	⬭	⬭	⬭	⬭	⬭
talk about the options in my head or with my partner.	⬭	⬭	⬭	⬭	⬭
imagine what the food will taste like.	⬭	⬭	⬭	⬭	⬭

LS12: When I listen to a band, I can't help:

	Never	Sometimes	Often	Usually	Always
watching the band members or the audience.	⬭	⬭	⬭	⬭	⬭
listening to the lyrics or the beats.	⬭	⬭	⬭	⬭	⬭
moving in time with the music.	⬭	⬭	⬭	⬭	⬭

LS13: When I concentrate, I most often:

	Never	Sometimes	Often	Usually	Always
focus on the words or the pictures in front of me.	⬭	⬭	⬭	⬭	⬭
discuss the problem or the possible solutions in my head.	⬭	⬭	⬭	⬭	⬭
move around a lot, fiddle with pens or pencils.	⬭	⬭	⬭	⬭	⬭

LS14: I choose household furnishings because I like:

	Never	Sometimes	Often	Usually	Always
their colours or how they look like.	◯	◯	◯	◯	◯
the descriptions that the sales-people give me.	◯	◯	◯	◯	◯
their textures and what it feels like to touch them.	◯	◯	◯	◯	◯

LS15: My first memory of an incident/ encounter is to:

	Never	Sometimes	Often	Usually	Always
look at something or someone.	◯	◯	◯	◯	◯
speak to someone.	◯	◯	◯	◯	◯
do something.	◯	◯	◯	◯	◯

LS16: When I'm anxious, I:

	Never	Sometimes	Often	Usually	Always
visualise the worst-case scenarios.	◯	◯	◯	◯	◯
talk over in my head what worries me most.	◯	◯	◯	◯	◯
can't sit still, fiddle or move around constantly.	◯	◯	◯	◯	◯

LS17: I feel especially connected to other people because of:

	Never	Sometimes	Often	Usually	Always
how they look.	◯	◯	◯	◯	◯
what they say to me.	◯	◯	◯	◯	◯
how they make me feel.	◯	◯	◯	◯	◯

LS18: When I have to revise for an exam, I generally:

	Never	Sometimes	Often	Usually	Always
write lots of revision notes or diagrams.	◯	◯	◯	◯	◯
talk over my notes alone or with other people.	◯	◯	◯	◯	◯
imagine making the movement or creating the formulas.	◯	◯	◯	◯	◯

LS19: If I am explaining to someone, I tend to:

	Never	Sometimes	Often	Usually	Always
show them what I mean.	◯	◯	◯	◯	◯
explain to them in different ways until they understand.	◯	◯	◯	◯	◯
encourage them to try or talk them through my idea as they do it.	◯	◯	◯	◯	◯

LS20: I really love:

	Never	Sometimes	Often	Usually	Always
watching films, photography, people or looking at art.	◯	◯	◯	◯	◯
listening to music, the radio or talking to friends.	◯	◯	◯	◯	◯
taking part in sports activities, eating foods or dancing.	◯	◯	◯	◯	◯

LS21: Most of my free time is spent:

	Never	Sometimes	Often	Usually	Always
watching television.	◯	◯	◯	◯	◯
talking to friends.	◯	◯	◯	◯	◯
doing physical activities or making things.	◯	◯	◯	◯	◯

LS22: When I first contact a person, I:

	Never	Sometimes	Often	Usually	Always
arrange a face-to-face meeting.	◯	◯	◯	◯	◯
talk to them on the telephone.	◯	◯	◯	◯	◯
try to get together whilst doing something else, such as an activity or a meal.	◯	◯	◯	◯	◯

LS23: I first notice how people:

	Never	Sometimes	Often	Usually	Always
look or dress.	◯	◯	◯	◯	◯
sound or speak.	◯	◯	◯	◯	◯
stand or move.	◯	◯	◯	◯	◯

LS24: If I am angry, I tend to:

	Never	Sometimes	Often	Usually	Always
keep replaying in my mind what it is that has upset me.					
raise my voice or tell people how I feel.					
stamp about, slam doors or physically demonstrate my anger.					

LS25: I find it easiest to remember:

	Never	Sometimes	Often	Usually	Always
faces.					
names.					
things I have done.					

LS26: I think I can tell if someone is lying if:

	Never	Sometimes	Often	Usually	Always
he/ she avoids looking at you.					
his/ her voice changes.					
he/ she gives you funny vibes.					

LS27: When I meet an old friend:

	Never	Sometimes	Often	Usually	Always
I say "It's great to see you!"					
I say "It's great to hear from you!"					
I give them a hug or a handshake.					

LS28: I remember things best by:

	Never	Sometimes	Often	Usually	Always
writing notes or keeping printed details.					
saying them aloud or repeating key points in my head.					
doing or practising the activity or imagining it being done.					

LS29: If I have to complain about faulty goods, I am most comfortable:

	Never	Sometimes	Often	Usually	Always
writing a letter.					
complaining over the phone.					
taking the item back to the store or posting it to head office.					

LS30: I tend to say:

	Never	Sometimes	Often	Usually	Always
I see what you mean.					
I hear what you are saying.					
I know how you feel.					

Thank you for your participation! ☺

Appendix E

Consent Form

An Extension of Unified Theory of Acceptance and Use of Technology Model: Exploring the Antecedents of Undergraduates' Technology Use

CONSENT FORM

Greetings!
You are invited to participate in this research project to explore the factors that influence the students' technology use through the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

Confidentiality:

All information and responses you supply in this research will be kept confidential by the principal investigator and the research team, and will not be made available to the public unless disclosure is required by law.

Disclosure:

Data and information obtained from this study will not identify you individually. The data and information may be given to the sponsor and/or regulatory authorities and may be published or be reused for research purposes not detailed within this consent form. However, your identity will not be disclosed. The original records will be reviewed by the principal investigator and the research team, the UTAR Scientific and Ethical Review Committee, the sponsor and regulatory authorities for the purpose of verifying research procedures and/or data.

Voluntary Participation:

You understand that participation in this study is voluntary and that if you decide not to participate, you will experience no penalty or loss of benefits to which you would otherwise be entitled. If you decide to participate, you may subsequently change your mind about being in the study, and may stop participating at any time.

By signing this consent form, you authorize the record review, publication and re-utilisation of data and information storage, and data transfer as described above.

Declaration:
I have read or have the information above read to me, in the language understandable to me. The above content has been fully explained to me. I have asked all questions that I need to know about the study and this form. All my questions have been answered. I have read, or have had read to me, all pages of this consent form and the risks described. I voluntarily consent and offer to take part in this study. By signing this consent form, I certify that all information I have given is true and correct to the best of my knowledge. **I will not hold UTAR or the research team responsible for any consequences and/or liability whatsoever arising from my participation in this study.**

Consent:
If you wish to participate in this study, kindly sign below.

Signature of Participant		IC Number	
Telephone/HP Number		Date	

Statement:
I have fully explained to the participant taking part in this study what he/she can expect by virtue of his/her participation. The participant who is giving consent to take part in this study understands the language that I have used, reads well enough to understand this form, or is able to hear and understand the contents of the form when read to him or her.

To the best of my knowledge, when the participant signed this form, he/she understands:

- That taking part in the study is voluntary
- What the study is about
- What needs to be done
- What are the potential benefits

Signature of the Researcher		IC Number	
Name of the Researcher		Date	

Appendix F

Sample Size Determination Table (Barlett, Kotrlink, & Higgins, 2001)

Population size	Sample size					
	Continuous data (margin of error = .03)			Categorical data (margin of error = .05)		
	alpha = .10 t = 1.65	alpha = .05 t = 1.96	alpha = .01 t = 2.58	p = .50 t = 1.65	p = .50 t = 1.96	p = .50 t = 2.58
100	46	55	68	74	80	87
200	59	75	102	116	132	154
300	65	85	123	143	169	207
400	69	92	137	162	196	250
500	72	96	147	176	218	286
600	73	100	155	187	235	316
700	75	102	161	196	249	341
800	76	104	166	203	260	363
900	76	105	170	209	270	382
1,000	77	106	173	213	278	399
1,500	79	110	183	230	306	461
2,000	83	112	189	239	323	499
4,000	83	119	198	254	351	570
6,000	83	119	209	259	362	598
8,000	83	119	209	262	367	613
10,000	83	119	209	264	370	623

NOTE: The margins of error used in the table were .03 for continuous data and .05 for categorical data. Researchers may use this table if the margin of error shown is appropriate for their study; however, the appropriate sample size must be calculated if these error rates are not appropriate. Table developed by Bartlett, Kotrlik, & Higgins.

Appendix G

Determining Sample Size (Israel, 1992)

Table . Sample Size for ±3%, ±5%, ±7%, and ±10% Precision Levels where Confidence Level Is 95% and P=.5.

Size of Population	Sample Size (n) for Precision (e) of:			
	±3%	±5%	±7%	±10%
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.

Appendix H

Invitation to be Panel of Instrument Validation (Expert 1)

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Date: 15th August 2014

Professor Dr. Timothy Teo
Faculty of Education
University of Macau, E33
Av. Da Universidade, Taipa
Macau, China

Dear Prof. Dr. Timothy,

INVITATION TO BE PANEL OF INSTRUMENT VALIDATION

Greetings! In response to the subject above, I would like to invite you to be a part of an expert review panel to evaluate the content validity of my Master of Philosophy (Social Science) supervisee's questionnaire.

Name	:Tiny Tey Chiu Yuen,
Index number	:14AAM05445
Field of study	:Educational Technology
Research title	:Relationship between Undergraduates' Learning Styles, Achievement Goal and Technology Use Behaviour among Arts and Science Undergraduates

In concern with this, attached documents are the relevant questionnaire and a brief Chapter 1 of her research proposal.

Your guidance and advice in improving the research quality and development will be highly appreciated.

Thank you very much and I look forward to hearing from you soon.

Best regards,

.....

Assistant Professor Dr. Priscilla Moses
Deputy Dean (R&D and Postgraduate Programmes)
Faculty of Arts and Social Science
Universiti Tunku Abdul Rahman
Perak Campus

Address: No 9, Jalan Bersatu 13/4, 46200 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Postal Address: P O Box 11384, 50744 Kuala Lumpur, Malaysia.
Tel: (603) 7958 2628 Fax: (603) 7956 1933 Homepage: http://www.utar.edu.my

Appendix I

Invitation to be Panel of Instrument Validation (Expert 2)

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Date: 15th August 2014

Associate Professor Dr. Wong Su Luan
Faculty of Educational Studies
Universiti Putra Malaysia
43400 UPM Serdang
Selangor, Malaysia

Dear Assoc. Prof. Dr. Wong,

INVITATION TO BE PANEL OF INSTRUMENT VALIDATION

Greetings! In response to the subject above, I would like to invite you to be a part of an expert review panel to evaluate the content validity of my Master of Philosophy (Social Science) supervisee's questionnaire.

Name	:Tiny Tey Chiu Yuen,
Index number	:14AAM05445
Field of study	:Educational Technology
Research title	:Relationship between Undergraduates' Learning Styles, Achievement Goal and Technology Use Behaviour among Arts and Science Undergraduates

In concern with this, attached documents are the relevant questionnaire and a brief Chapter 1 of her research proposal.

Your guidance and advice in improving the research quality and development will be highly appreciated.

Thank you very much and I look forward to hearing from you soon.

Best regards,

.....
Assistant Professor Dr. Priscilla Moses
Deputy Dean (R&D and Postgraduate Programmes)
Faculty of Arts and Social Science
Universiti Tunku Abdul Rahman
Perak Campus

Address: No.9, Jalan Bersatu 13/4, 46200 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Postal Address: P O Box 11384, 50744 Kuala Lumpur, Malaysia.
Tel: (603) 7958 2628 **Fax:** (603) 7956 1923 **Homepage:** http://www.utar.edu.my

Appendix J

Ethical Clearance

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

U/SERC/33/2014

13 November 2014

Dr Priscilla Moses
Department of Languages and Linguistics
Faculty of Arts and Social Science
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar
Perak

Dear Dr Priscilla,

Ethical Approval For Research Project/Protocol

We refer to your application dated 31 October 2014 which was tabled for discussion at the UTAR Scientific and Ethical Review Committee (SERC) meeting of 11 November 2014 and are pleased to inform you that your application for ethical approval for your proposed research project has been approved by SERC.

The details of your research project are as follows:

Research Title	Exploring the Antecedents of Students' Technology Use through UTAUT Model: An Online Survey
Investigator(s)	Asst Prof Dr Priscilla Moses (PI) Asst Prof Dr Cheah Phaik Kin Prof Dr Timothy Teo (University of Macau)(UTAR ICP)
External Parties Involved	Assoc Prof Dr Wong Su Luan, Faculty of Educational Studies, UPM
Research Area	Arts and Social Science
Research Location	UTAR Perak Campus
No of Participants	1,000 undergraduates (500 from Faculty of Arts and Social Science & 500 from Faculty of Science)
Research Costs	UTAR Research Fund 2013 Cycle 2
Approval Validity	2014 – 2015

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research.
(2) Confidentiality of participants' personal data must be maintained; and
(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

As you collect personal data of participants in your study, please have the participants in the research sign the attached Personal Data Protection Statement for your records.

The University wishes you all the best in your research.

Thank you.

Yours sincerely,

Professor Dr Lee Sze Wei
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Arts and Social Science
Director, Institute of Postgraduate Studies and Research