FACTORS INFLUENCING STUDENTS' INTENTION TO UTILIZE A WEB-BASED COLLABORATION TOOL

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ABSTRACT

The purpose of this study was to explore: (1) factors influencing students' perceptions towards the pedagogical benefits of web-based collaboration tool, Wiki, in terms of confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation; (2) relationships between three factors i.e. attitude, social influence and perceived behavioural control, and behavioural intention towards the use of Wiki; and (3) factors that best predict students' intention to use Wiki in the future. The participants were one hundred and nine (n=109) higher education students of a Malaysian public university. Mixed-method research design was employed in which both quantitative and qualitative data are gathered concurrently. Data were collected from online surveys and focus group interviews. Quantitative data obtained from the online surveys were statistically analyzed using Pearson's Product Moment correlational analysis to investigate the relationship between the factors (attitude, social influence, and perceived behavioural control) and behavioural intention towards the use of Wiki. Next, partial least squares structural equation modelling (PLS-SEM) technique was applied to analyze factors that best predict students' intention to adopt Wiki in the future. Qualitative data were analyzed using constant comparative method. Findings indicated that learners positively perceived Wiki as beneficial in five areas, namely confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation. The findings were further supported by analyses of qualitative findings where four themes emerged: (1) learning benefits; (2) collaboration benefits; (3) technology advantages; and (4) challenges. Additionally, results from correlational analysis indicated significant positive relationships between the three factors i.e. attitude, social influence, and perceived behavioural control, and students' behavioural intention towards the use of Wiki. Among these three factors,

attitude was found to be the highest significant predictor of students' intention to adopt Wiki in the future, followed by social influence. Findings of this study highlight the critical importance for nurturing positive attitude and create stimulating social environment for students to use Wiki in the future.

FAKTOR-FAKTOR YANG MEMPENGARUHI NIAT PELAJAR UNTUK MENGGUNAKAN ALAT KOLABORATIF BERASASKAN LAMAN WEB

ABSTRAK

Tujuan kajian ini adalah untuk meneroka: (1) faktor-faktor yang mempengaruhi persepsi pelajar terhadap manfaat pedagogi alat kolaboratif bersasaskan laman web, Wiki, dari segi keyakinan menulis, perkongsian ilmu, kemajuan di dalam kemahiran menulis, interaksi secara berkumpulan, serta motivasi; (2) hubungan di antara tiga faktor, iaitu sikap, pengaruh sosial dan kawalan tingkahlaku yang dapat dilihat, dan niat tingkah laku terhadap penggunaan Wiki; dan (3) faktor yang paling baik untuk meramal niat pelajar untuk menggunakan Wiki pada masa hadapan. Peserta terdiri daripada satu ratus sembilan pelajar institusi pengajian tinggi di sebuah universiti awam di Malaysia. Reka bentuk penyelidikan secara campuran digunakan di mana kedua-dua data kuantitatif dan kualitatif dikumpulkan secara serentak. Data dikumpul melalui kaji selidik secara dalam talian dan temubual berfokus. Data kuantitatif diperolehi daripada kaji selidik secara dalam talian telah dianalisa secara statistic menggunakan analisis korelasi Pearson's Product Moment untuk mengkaji hubungan di antara faktor (sikap, pengaruh sosial dan kawalan tingkahlaku yang dapat dilihat) dan niat tingkah laku terhadap penggunaan Wiki. Seterusnya, teknik partial least squares structural equation modelling (PLS-SEM) digunakan untuk menganalisa faktor yang paling baik untuk meramal niat pelajar untuk menggunakan Wiki pada masa hadapan. Data kualitatif telah dianalisa menggunakan kaedah constant comparative method. Dapatan kajian menunjukkan bahawa pelajar mempunyai persepsi positif terhadap manfaat penggunaan Wiki dalam lima aspek, iaitu keyakinan menulis, perkongsian ilmu, kemajuan di dalam kemahiran menulis, interaksi secara berkumpulan, serta motivasi. Penemuan itu turut disokong oleh analisis dapatan kualitatif di mana empat tema dijumpai: (1) faedah pembelajaran; (2) faedah

bekerjasama secara kolaboratif; (3) kelebihan teknologi; dan (4) cabaran. Selain itu, keputusan daripada analisis korelasi menunjukkan hubungan positif yang signifikan di antara tiga faktor iaitu sikap, pengaruh sosial dan kawalan tingkahlaku yang dapat dilihat, dan niat tingkah laku terhadap penggunaan Wiki. Di antara ketiga-tiga faktor, sikap didapati menjadi peramal signifikan yang tertinggi untuk niat tingkah laku terhadap penggunaan Wiki di masa hadapan, diikuti dengan pengaruh sosial. Hasil kajian ini menyerlahkan betapa pentingnya untuk memupuk sikap positif dan mewujudkan persekitaran sosial yang merangsangkan untuk pelajar menggunakan Wiki pada masa hadapan.

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LIST OF SYMBOLS, ABBREVIATIONS, OR NOMENCLATURE

ANOVA	:	Analysis of Variance
ATT	:	Attitude
AVE	:	Average Variance Extracted
BTS	:	Bartlett's Test of Sphericity
CB-SEM	:	Covariance-Based Structural Equation Modelling
COMP	:	Compatibility
CR	:	Composite Reliability
DTPB	:	Decomposed Theory of Planned Behaviour
EFA	:	Exploratory Factor Analysis
EU	:	Ease of Use
INT	:	Behavioural Intention
KMO	:	Kaiser-Mayer-Olkin
LI	:	Lecturer Influence
PBC	:	Perceived Behavioural Control
PCA	:	Principal Component Analysis
PI	:	Peer Influence
PLS	:	Partial Least Squares
PLS-SEM	:	Partial Least Squares Structural Equation Modelling
PU	:	Perceived Usefulness
RFC	:	Resource Facilitating Condition
SD	:	Standard Deviation
SE	:	Self-Efficacy

SEM	:	Structural Equation Modelling
SI	:	Social Influence
SN	:	Subjective Norm
SPSS	:	Statistical Package for Social Science
TFC	:	Technology Facilitating Condition
TRA	:	Theory of Reasoned Action
TPB	:	Theory of Planned Behaviour
VIF	:	Variance Inflation Factors
WYSIWYG	:	What You See is What You Get
ZPD	:	Zone of Proximal Development

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

Background of Study

The rapid growth and advancement of technology in this era has made it an increasingly important and a powerful medium to the society. In this digital era, the use of technology, especially the Internet has opened the door and offers people in the society with various possibilities in terms of resources, knowledge and technological tools. These days, people are more connected to the Internet compared to previous days due to the emergence and availability of high capability of technological tools such as computers, mobile phones, and tablets.

As of February 2016, the statistics for Internet users in Malaysia is 21,056,126 with the entire national population of 31,545,990 people, in which it covers 68.5% of the Internet penetration in the country (Malaysian Communications and Multimedia Commission, 2016a). In addition, trend shows that a majority of Malaysians are savvy in multitasking with several technology devices by accessing through various platforms and the Internet is commonly used by them, thus, responsible parties should play a positive role in increasing the awareness and adoption of new Information and Communication Technology (ICT) among Malaysians (Malaysian Communications and Multimedia Commission, 2016b).

The twenty-first (21^{st}) century are characterized by enormous, exponential technological change, and the technology tools are moving at a fast speed (Prensky, 2007). The development and diffusion of information and communication technologies (ICT) are having a profound effect on the modern day life, in which it was due to the affordances of new digital media, which bridge the interactive features

of speech and writing, including the information structure (Warschauer & Matuchniak, 2010). People in the society, especially educators and students can move forward and take the opportunity to explore the technological tools offered. This could be done by adapting the use of technology into their teaching and learning process.

In this digital age, the availability of various Internet technologies, such as web-based collaboration tools has opened the doors for users to various potential for interaction and knowledge sharing efforts. This is because, the capabilities of digital technologies are diverse and extensive, allowing the possibility to identify almost any of the needs of the learners' journey, for instance using a remotely stored information, search engines, multimedia, synchronous and asynchronous communication, simulation, modelling, adaptive decision-making, user-driven design tools, and many others (Laurillard, 2008). Both learners and educators need to keep pace with the massive information, technological changes and the challenges of this digital age.

The availability of these technologies could facilitate the teaching and learning process in the twenty-first (21^{st}) century with innovative approaches that could promote learning not only inside, but also beyond the classroom walls. However, it is important to note that a simple increase in information and communication technology (ICT) provision does not guarantee an enhanced educational performance (Livingstone, 2012). Instead, the ability of technology and online learning to represent an advancement in education depends on how the technologies are being used, and how they are embedded together in the lesson pedagogy (Lai, 2011).

The availability of web-based collaboration tools are able to provide users with rich collaborative experiences that could accommodate people with various learning needs, in which it could enhance the teaching and learning process. With technology, learning is no longer confined into the small classroom space in the traditional learning

environment. Technology can change the concept of learning, where it allows learners to expand the capabilities and knowledge beyond the classroom and textbooks. This is due to the fact that the digital technology has the capability to blurs the boundary between formal and informal learning experiences (Lai, 2011).

Due to the flexibility and adaptability of technology, users could work together collaboratively and expand the knowledge experience. This is especially useful in the education field where technology can be integrated together with the lesson content and in turn could enhance the teaching and learning experience. With just a few keystrokes, students can explore the world using boundless online resources and a wide array of digital media to obtain the information they seek and then discuss their findings in real-time conversations with experts and other students (Smaldino, Lowther & Russell, 2012).

Moreover, the use of appropriate technology in the classroom could accommodate students with different learning needs and styles as it includes audios, texts, and graphics. Technology plays an important role in the classroom with diverse learners, where adapted and specially designed technology can contribute enormously to effective instruction and can help students to achieve their highest potential regardless of their innate abilities (Smaldino et al., 2012).

The opportunities that these web-based collaboration tools can offer provide various ways to expand the opportunities for the teaching and learning process. It is also hoped that by grabbing these opportunities, the teaching and learning process can be enhanced and improved. Enhanced learning implies a value judgement suggesting that there is an increase or improvement in the quality, value or extent in the teaching and learning process (Kirkwood & Price, 2014).

This study aimed to look into students' perception in regards to the pedagogical benefits of a web-based collaboration tool, namely Wiki, for teaching and learning purposes, particularly in the higher education context. Additionally, this study intended to find out the factors that influence students' intention to adopt Wiki for teaching and learning purposes in the future. Subsequently, this study aimed to find out which factor that best predict students' intention to utilize the web-based collaboration tool for teaching and learning purposes. This chapter discussed the background of study, problem statement, research objectives, research questions, research hypotheses, rationale of study, significance of study, limitations of study, and also the conceptual and operational definition of terms.

Collaborative learning. Living in a society, the act of doing things together, be it working on a project paper with fellow classmates or a simple action of discussing about what is happening in the evening news has become a norm in people's daily lives. This is a simple representation of the act of collaboration between two or more individuals. In the context of this study, the term "collaborative" and "learning", which in turn becomes "collaborative learning", are used throughout the study. According to So and Brush (2007), collaborative learning can be seen as a form of learner and learner interaction.

The term collaborative learning only came to interest in American college teachers and has widely been used in 1980s, but the term was coined and the basic idea was first developed in the 1950s and 1960s by a group of British secondary school teachers and by a biologist studying British post-graduate education, specifically in medical education (Bruffee, 1984).

A study was conducted among medical students in Britain by Abercrombie (1964), and the results found that the students who diagnose and learn collaboratively acquired good medical judgement which is faster in comparison to those who did it individually (as cited in Bruffee, 1984). This is the crux of collaborative learning where individuals will examine one issue that was given together, discuss it with each other, and then arrive at a goal that they all have agreed upon.

Dillenbourg (1999), described the term collaborative learning broadly as "a situation, where two or more people learn or attempt to learn something together" (p. 1). In addition, Dillenbourg (1999) further interpreted the term two or more people as a pair, a small group as three to five subjects, a class as twenty to thirty subjects, a community as a few hundreds or thousands of people, and finally, a society as several thousands or millions of people. In addition, in collaborative learning, the term learning together can be interpreted as a different forms of interaction, be it face-to-face or computer-mediated, synchronous or asynchronous, and whether it is a truly joint effort or whether the labour is divided in a systematic way (Dillenbourg, 1999).

On the whole, collaborative learning occurred when both parties work together as a team instead of the person doing the task individually. Collaborative learning is a student-centred approach, where it requires students to be active participants and they are more in-control of their learning. In collaborative learning, students are active learners instead of passive recipients of knowledge. In addition, during the process of collaborative learning, students are responsible for one another's learning as well as their own learning, thus, the success of one student helps other students to be successful (Gokhale, 1995).

This method of teaching and learning can be seen as an alternative to the traditional classroom teaching whereby the instructional method is more teacher-centred. In a teacher-centred classroom approach, students learn solely from the teacher whey they will sit and listen to the instruction or knowledge given to them. On the other hand, when learning collaboratively in a student-centred instruction, students are given the authority to examine and explore the learning components themselves. This involves creating and managing meaningful learning experiences through real world problems (Gokhale, 1995). Students will later make meaning out of the components by the means of discussion and doing it together with their peers to build their knowledge.

The act of collaboration, either among students, or between students and the teacher, could assist the students in advancing through their zone of proximal development. The zone of proximal development are the gaps between what students could accomplish by themselves and what they could accomplish when they cooperate with others (Vygotsky, 1962, as cited in Warschauer, 1997). In this process, the more competent students help and guide their less competent peers to develop skills and achieve what they are not able to do when they do it themselves. This can be achieved through the process of effective interactions and collaboration. This shows that through the act of collaboration, a person could develop their intellectual abilities and accomplish a task with the help of others in which they were unable to achieve it individually.

The claim was further supported by the findings by Gokhale (1995) where it was found that students who participated in collaborative learning activities had performed significantly better that those who learned individually. Collaborative learning has the ability to foster the development of critical thinking through

discussion among learners, clarification of ideas, and evaluation of the other person's idea (Gokhale, 1995). In collaborative learning, the achievement of a person is influenced by the achievements of his partners, where positive interdependence exists when group members shares a common objective, sharing resources, roles, and tasks (Chang, Morales-Arroyo, Than, Tun & Wang, 2011).

Collaborative learning and Wiki. In the twenty-first (21st) century world that we live in today, the new generation of learners are more exposed and connected to the Internet compared to the previous generation. People are more connected to one another due to the mass availability of the digital environment and tools such as smartphones, computers, and tablets. These tools are mostly connected to the Internet, expanding the communication and knowledge sharing abilities among people in the society.

Due to the boom of Web 2.0 tools, learning is not only limited to the boundary of the four classroom walls. Instead, it can be done regardless of the teachers' and learners' geographical location and time. Web-based collaboration tool, such as Wiki could provide users with an interesting and innovative learning environment that expands the potential for interaction, knowledge sharing and facilitation of learning activities in a community. Course instructors could adapt and utilize Wiki to support students' individual or collaborative learning.

Several past researches have been conducted specifically on the implementation of Wiki for teaching and learning purposes in various educational level and context (Chong, Tan & Abdullah, 2011; Elgort, Smith, & Toland, 2008; Franco, 2008; Hughes & Narayan, 2009; Hu & Johnston, 2012; Li, Chu, Ki, & Woo,

2010; Li, Chu, Ki, & Woo, 2012; Miyazoe, 2010; Rodrigues, 2016; Woo, Chu, Ho, & Li, 2011; Zorko, 2009).

These literatures suggested that Wiki has the ability and advantage in providing users with various possibilities in which it could help promote the teaching and learning process (Chong, Tan & Abdullah, 2011; Elgort, Smith, & Toland, 2008; Franco, 2008; Hughes & Narayan, 2009; Hu & Johnston, 2012; Li, Chu, Ki, & Woo, 2010; Li, Chu, Ki, & Woo, 2012; Miyazoe, 2010; Rodrigues, 2016; Woo, Chu, Ho, & Li, 2011; Zorko, 2009). Based on the literatures, it was found that Wiki is beneficial in assisting the progress of students' group work, encouraging individual participation, and also has the ability in enhancing interactions among group members (Elgort et al., 2008).

Another study conducted by Franco (2008) which examined Wiki activities for writing purposes reported that students' writing opportunities were maximized, interest and motivation were increased, writing skills were improved, and they learned cooperatively instead of competing with each other. The commenting feature in Wiki which enables fellow students or instructor to write a comment in regards to students' work, were proven useful in helping them to learn better (Woo et al., 2011; Zorko, 2009). This causes students to be more aware of their writing process, and motivates them to do better due to the public nature of Wiki where everyone can see their work.

Another study conducted by Chong et al. (2011) which explored the use of Wiki for a group of secondary school students in Malaysia to work collaboratively in writing a science dictionary found that students would read their peers' latest work before they start their own writing. The combined reading and writing process enable them to enhance their knowledge. However, the study found that there was a lack of

active peer review where students were more eager to work on their own task rather than commenting on their peers' work.

Problem Statement

In the context of learning environment, the Information and Communication Technology (ICT) can be used as a tool to achieve educational ends, an enabler to the learning process, since it possesses the power of scale, allowing many individuals to learn according to their own pace at the same time (Alias Daud, Zainab & Zaitun, 2003). Although the implementation of Information and Communication Technology (ICT) in the learning environment has already becoming a reality in Malaysia, however, Malaysia still has far to go as the proper use of the tool and still needs to be perfected and the current impact of Information and Communication Technology (ICT) usage needs to be monitored closely to ascertain whether the desired learning outcomes are achieved (Alias Daud et al., 2003).

Moreover, report showed that over the past decade, the Information and Communication Technology (ICT) usage in education continues to lag expectations, both in terms of quantity and quality although it has tremendous potential to accelerate the learning of a wide range of knowledge and thinking skills (Ministry of Education Malaysia, 2015a). Web technologies, particularly web-based collaborative tool such as Wiki can be integrated into the classroom lesson to enhance the teaching and learning process.

In addition, the use of web-based collaborative tool could also accommodate students with different needs and abilities. This resulted in fuller realization of their capabilities and potential. However, not all educators are willing to embrace the change from their conventional instructional method to incorporating technology in

their teaching (Levin & Arafeh, 2002, as cited in Simonson, Smaldino, Albright & Zvacek, 2007). According to Levin and Arafeh (2002), there was a reluctance on the instructors' side to assign students with web-based learning tasks due to the lack of success among students (as cited in Simonson et al., 2007)

Although a majority of learners are aware that they can gain a lot from learning in a student-centred and collaborative setting, however, many did not collaborate with each other and still prefers conventional learning setting compared to the new form of learning method (Oliver & Omari, 2001; Williams & Pury, 2002). Oliver and Omari (2001) explored on Australian university undergraduates' responses towards the usage of a Web-based environment to support collaborating and learning found that almost half of the students stated that they do not favour the new form of learning although they have stated a level of enjoyment and satisfaction in an online learning setting.

Therefore, this study is committed to look into students' perspectives in regards to the use of one particular web-based collaborative technology, which is Wiki. This study also aimed to develop a further understanding of students' perception towards the pedagogical benefits of Wiki such as increasing confidence in writing, improving knowledge sharing, improving writing, enhancing group interaction, and increasing motivation.

By doing this, it could help learners to appreciate and realize the potential of Wiki which can be used to enhance the teaching and learning process. It is important to look from the students' point of view because if they feel that online collaboration does not help them in their learning progress, they may be reluctant and will not enjoy the activities given, In addition, they also may feel burdened if given a task or activities related to it, and may also choose not to participate in the classroom activities. This in turn could hinder the effectiveness of the teaching and learning process.

Additionally, previous studies conducted on the use of web-based technology tools did not incorporate the effect of face-to-face pedagogy in order to understand students' view on how Wiki may or may not be helping them in collaborating (Ajjan & Hartshorne, 2008; Chong et al., 2011; Elgort et al., 2008; Franco, 2008; Hughes & Narayan, 2009; Li et al., 2010; Miyazoe, 2010; Woo et al., 2011; Zorko, 2009). Therefore this study will fill the gap in the literature by taking into account the pedagogy in the face-to-face lesson and what happen when Wiki is used concurrently with the class session instead of just an out-of-class tool. This is due to the fact that online collaboration will not happen independently as a different set of lesson, but it helps in scaffolding students during their writing task which is an extension from the face-to-face lesson.

Apart from that, this study also aimed to extend the previous study by Ajjan and Hartshorne (2008) which suggested a further research applying the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995) to understand and predict students' intentions and behaviour to use Web 2.0 technology to supplement their in-class learning. The previous study by Ajjan and Hartshorne (2008) focused on the faculty's awareness and intention to adopt Web 2.0 technologies to supplement classroom instruction. Therefore this study will fill the gap by exploring the students' intention, particularly undergraduates in higher education institution to use Wiki for teaching and learning purposes.

The previous study by Ajjan and Hartshorne (2008) focused on various types of Web 2.0 technologies in general, such as text messaging, Wiki, social networks, and other Web 2.0 applications, where it has several types of use and impact on teaching and learning. The effect of each of these technologies on the learning environment could vary, depending on the type of Web 2.0 technologies that were used. Therefore,

based on the suggestion by Ajjan and Hartshorne (2008) which proposed that a further research should be conducted where only one particular Web 2.0 technology is used to examine the impact on the learning environment, this study aimed to control the type of Web 2.0 technologies used in the classroom. For that reason, this study focused on only one type of technology, which is Wiki.

Although a number of studies on Wiki usage for collaborative learning in the classroom has been conducted in the Malaysian context before, however they only focused on secondary school students (Chong et al., 2011; Kwan & Yunus, 2015; Singh, Harun, & Fareed, 2013). Therefore, this study fills the gap in the body of knowledge by looking into the use of Wiki for collaborative learning among undergraduates in a higher education institution in Malaysia based on their perceptions and using the Decomposed Theory of Planned Behaviour Model by Taylor and Todd (1995) to find out the factors that are related to students' intention to use Wiki in the future.

Purpose of Study

The purpose of this study was aimed to develop a further understanding in regards to higher education students' perception towards the pedagogical benefits of a web-based collaboration tool, namely Wiki, for teaching and learning purposes. For the purpose of this study, five (5) areas of the pedagogical benefits of Wiki were looked into. The five (5) pedagogical benefits of Wiki were: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

In addition, this study aimed to predict factors that relate to higher education students' intention to adopt the use of Wiki for their teaching and learning purposes. Subsequently, the factors that best predict students' intention to use Wiki in the future were also explored.

Research Objectives

There were three (3) research objectives that guided this study. The three (3) research objectives were:

1. To examine students' perceptions towards the pedagogical benefits of Wiki in terms of confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation.
2. To investigate the relationship between the determinants (attitude, social influence and perceived behavioural control) and behavioural intention towards the use of Wiki.
3. To find out which factors (attitude, social influence and perceived behavioural control) best predict students' intention to use Wiki in the future.

Research Questions

The following research questions were curated based on the research objectives which served as a guidance for this study. The research questions for this study were as follows:

1. What are the overall students' profile on the pedagogical benefits of Wiki?
    1.a. How do students perceive the pedagogical benefit of Wiki in terms of confidence in writing?

1.b How do students perceive the pedagogical benefit of Wiki in terms of knowledge sharing?

1.c How do students perceive the pedagogical benefit of Wiki in terms of improvement in writing?

1.d How do students perceive the pedagogical benefit of Wiki in terms of group interaction?

1.e How do students perceive the pedagogical benefit of Wiki in terms of motivation?

2. What is the relationship between the determinants (attitude, social influence, and perceived behavioural control) and students' behavioural intention towards the use of Wiki?

2.a What is the relationship between attitude and behavioural intention towards the use of Wiki?

2.b What is the relationship between social influence and behavioural intention towards the use of Wiki?

2.c What is the relationship between perceived behavioural control and behavioural intention towards the use of Wiki?

3. Which of the factors (attitude, social influence, and perceived behavioural control) best predict students' intention to adopt Wiki in the future?

Research Hypotheses

Based on Research Question 2, the research hypotheses for this study was formulated. There were eleven (11) research hypotheses that guided the Research Question 2 of this study. They research questions were as follows:

H_1 There is a positive relationship between perceived usefulness and students' attitude when using Wiki.

H_2 There is a positive relationship between ease of use and students' attitude when using Wiki.

H_3 There is a positive relationship between compatibility and students' attitude when using Wiki.

H_4 There is a positive relationship between attitude and behavioural intention towards the use of Wiki.

H_5 There is a positive relationship between peer influence and social influence when using Wiki.

H_6 There is a positive relationship between lecturer influence and social influence when using Wiki.

H_7 There is a positive relationship between social influence and behavioural intention towards the use of Wiki.

H_8 There is a positive relationship between self-efficacy and perceived behavioural control when using Wiki.

H_9 There is a positive relationship between technology facilitating condition and perceived behavioural control when using Wiki.

H_{10} There is a positive relationship between resource facilitating condition and perceived behavioural control when using Wiki.

H_{11} There is a positive relationship between perceived behavioural control and behavioural intention towards the use of Wiki.

Significance of Study

The aim of this study was to investigate the higher education students' perceptions towards the pedagogical benefits of a web-based collaboration tool, specifically Wiki, for collaborative learning purposes. The students' perceptions were investigated in five (5) major areas, which were: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Apart from that, the factors that are related to students' intention to use Wiki for teaching and learning purposes were also investigated. In addition, the factors that best predict students' intention to adopt Wiki in the future were further explored. This study makes four contributions related to the current research in this field of study.

First, this research will contribute to the growing body of knowledge in regards to the use of Wiki based on students' perspectives and opinions. This is because it is important to place the utmost consideration of learners' needs and perception while designing, developing, and delivering distance education courses (Sahin & Shelley, 2008). Often in a technology-integrated lesson, much emphasis is placed on the technology, ensuring the smoothness of the implementation process, while the targeted learners are often considered after the planning and the implementation of the instructional process (Simonson, Albright & Zvacek, 2007).

However, it is the learners' needs that is the most crucial factor and should be put into consideration when planning and designing a technology-integrated lesson. In an online course, learners' satisfaction is an important dimension in understanding the

success of the course (Simonson et al., 2007), and failing to meet this may result to low level of students' involvement (Hall, 2001, as cited in Sahin & Shelley, 2008).

By researching on the issues that are related to perceptions and intentions to use Wiki, this study will give an in-depth insight into designing a conducive Wiki-based learning experience according to students' preference and their own point of view. In addition, any issues related to the use of web-based collaborative tool, or Wiki, when integrated with the lesson that is faced by the students throughout their course can also be known.

Second, this research will also provide a better understanding on whether students perceive using Wiki as beneficial to their learning when online activities are integrated with face-to-face classroom instruction instead of just an out-of-class tool which were used separately from the classroom instruction. Through this study, the course instructor and designers could gain valuable insights on the use of Wiki to support in-class learning purposes and evaluate the suitability of the tool to supplement the blended learning course based on the feedbacks from the learners. This could provide the course instructor and course designer a further understanding and allows improvement for the future course design and delivery.

Third, various studies in regards to Wiki usage in the classroom have been conducted which used different theoretical models to examine the factors related to technology usage such as the Theory of Reasoned Action by Ajzen and Fishbein (1980), Technology Acceptance Model (TAM) by Davis (1989) and Theory of Planned Behaviour by Ajzen (1991). This research applied the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), which is a theoretical model that could explain behavioural intention on technology usage in a more comprehensive way. In addition, by using the Decomposed Theory of Planned

Behaviour (DTPB) by Taylor and Todd (1995), it provides a better understanding on the study of Wiki implementation and students' intention to use it for teaching and learning purposes.

The fourth significance of this research is to contribute to the body of information and explore the use of information and communication technology (ICT) in Malaysian educational context. As this study discussed the application and implementation of web-based collaboration tool, which is Wiki, among students in higher educational institution, this will provide a further clarification on users' acceptance of the use of technology in the classroom.

Moreover, several studies have been conducted on the use of information and communication technology (ICT) in Malaysian educational context, but using different models and theories to examine factors related to behavioural intention in general. Therefore, the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995) was used as a comprehensive model which could explain factors that influence users' intention to adopt technology for their learning. Therefore, this study provides a more comprehensive and detailed explanation to understand factors influencing students intention to use a web-based collaboration tool in the classroom.

Operational Definition of Terms

This section operationally defined several important variables that were constantly mentioned throughout this study. The operational definition of terms were as follows:

Attitude. Attitude, or ATT, can be described as a person's feelings toward performing a certain behaviour (Taylor & Todd, 1995). It reflects an individual's feeling, whether they prefer or do not prefer to perform a particular behaviour. Based

on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), attitude (ATT) is measured by three (3) determinants, which are: (1) perceived usefulness (PU); (2) perceived ease of use (EU); and (3) compatibility (COMP). According to the Decomposed Theory of Planned Behaviour (DTPB), attitude (ATT) is also one of the determinants of usage intention towards the use of web-based collaboration tool.

In this study, the term attitude (ATT) refers to the students' feelings or mental state about the use of one particular web-based collaboration tool, which is Wiki for teaching and learning purposes. Students' attitude towards Wiki can either be positive or negative. For instance, students may positively perceived Wiki as beneficial or helpful for their learning progress. On the other hand, students may also negatively perceived Wiki to be beneficial for their learning progress.

This study breaks down attitude into three (3) components according to the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995). The three (3) components are: (1) perceived usefulness (PU); (2) ease of use (EU); and (3) compatibility (COMP). Based on the Decomposed Theory of Planned Behaviour (DTPB), attitude (ATT) is also one of the measures that could determine students' behavioural intention to adopt the use Wiki for their learning purposes.

Behavioural intention. Behavioural intention, or INT, can be defined as the indications of the level of individual's willingness or the effort they are planning to exert to perform a certain behaviour (Ajzen, 1991). Ajzen (1991) suggested that the stronger the intention to engage in a particular behaviour, the more likely should be its performance. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), behavioural intention, (INT), is influenced by three (3)

measures, which are: (1) attitude (ATT); (2) subjective norm (SN); and (3) perceived behavioural control (PBC).

In the context of this study, behavioural intention, (INT), refers to students' intention to engage in Wiki activities for teaching and learning purposes. It is hypothesized to be measured by three (3) determinants, which are: (1) students' attitude (ATT); (2) social influence (SI); and (3) perceived behavioural control (PBC).

Blended learning. The term blended learning, or also called hybrid learning, as defined by Garrison and Kanuka (2004) is, "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (p. 96). In essential, a blended learning classroom is a combination of two learning modes, which is the traditional classroom-based instruction and web-based instruction. The transformation of this learning method allows more flexibility in terms of geographical location and time for both course instructor and learners.

The Sloan Consortium report which presents the latest data about the growth and spread of online education in the United States provided a criteria for a blended learning or hybrid courses, where it stated that the course should combine both online and face-to-face delivery of instruction, and 30% to 79% of the course's content is delivered online (Simonson et al., 2007).

In the context of this study, blended learning can be referred to as the execution of teaching and learning process in two forms, in which the delivery of contents are conducted online and offline. The online learning instruction, or web-based learning instruction was conducted via a web-based collaboration tool, which is Wiki.

The type of Wiki used is the PBworks (www.pbworks.com) platform. On the other hand, the offline instruction, or face-to-face instruction, was held at the university's campus during class hours. The use of Wiki and face-to-face instruction were executed interchangeably to supplement one another instead of doing it separately.

Collaborative learning. The term collaborative learning can be described as the instructional method where students work together in small groups towards achieving a specific goal (Gokhale, 1995). Collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together, mutually searching for understanding, solutions, or meanings, or creating a product (Smith & MacGregor, 1992). Collaborative learning involves a high degree of interaction, where students learn actively and are responsible for each other's learning.

This type of learning enhances critical thinking because it encourages students to participate actively in their learning process. Students construct their own knowledge by participating in their own learning process rather than just receiving the knowledge from the teacher. On the other hand, the teacher's responsibilities were shifted from the sole provider of knowledge, to a facilitator, where he or she will assist students in achieving the intended learning goals.

In the context of this study, collaborative learning occurs when the learners work together in small groups of two to three members to accomplish the assignments and activities given to them during the course. The collaboration activities was conducted online, via Wiki, which was chosen as a platform for the learners to discuss, share views, write, edit and comment on their peers' work.

Confidence in writing. The definition of confidence according to Merriam-Webster Online (2017) is "a feeling or consciousness of one's power or of reliance on one's circumstances". Therefore, in the context of this study the term confidence in writing refers to the student's level of confidence or feeling when conducting their writing task and assignments, particularly in the class Wiki.

In the context of this study, the students' writing process involves adding, editing, or deleting text in the class Wiki. The term confidence in writing is derived from one of the five (5) pedagogical benefits of Wiki, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Compatibility. The term compatibility, or COMP, can be defined as the extent in which a particular technology fits the task, values, experiences, and needs of the user (Rogers, 2003, as cited in Rogers, Rivera & Wiley, 2005). User may deem a technology as compatible when it meets their existing values, beliefs, and life experiences. As mentioned, users are more likely to adopt an innovation more rapidly when they deem that the technology is compatible with their needs. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), compatibility (COMP) is one of the beliefs that measure attitude (ATT).

Therefore, in the context of this study, compatibility (COMP) can be defined as the degree in which students think that using Wiki technology would be compatible with their learning activities and needs. If the learner think that using Wiki will help her to move forward and succeed in the learning course, there is a higher chance and possibility that the student will adopt the Wiki usage. On the other hand, if the learner think that using will not help him or her to move forwards and succeed in the learning

course, there is a lower chance and possibility that the student will adopt the Wiki usage.

Ease of use. The term ease of use, or EU, can be described as the level of difficulties that a person perceived he or she needed to undertake in using a particular technology. In other words, it is an individual's perception on how the use of a new technology is free of effort and easy to use (Davis, 1989). Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), ease of use (EU) is one of the determinants of attitude (ATT) towards usage intention (INT)

Therefore, in the context of this study, the term ease of use (EU) can be defined as the extent in which students think that using Wiki is easy and effortless to use. If the learner perceived Wiki as easy to use and free of effort, there is a higher chance and likelihood that the student will adopt the Wiki usage. On the other hand, if the learner perceived Wiki as difficult to use, there is a lower chance and likelihood that the student will adopt the Wiki usage.

Group interaction. The definition of word group according to Merriam-Webster Online (2017) is "a number of individuals assembled together or having some unifying relationship". On the other hand, the word interaction according to Merriam-Webster Online (2017) is "mutual or reciprocal action or influence." Therefore, the term group interaction can be defined as the exchanges of verbal or non-verbal communication between two or more individuals in social situations.

In the context of this study, the term group interaction can be defined as the social interaction between two or more students which occurred in the class Wiki. The interaction involves communicating, negotiating and also voicing up their opinions in

regard to the course content. The group interaction may involve students interacting among themselves, or with the course instructor. The term group interaction is derived from one of the five (5) pedagogical benefits of Wiki, which are: (1) group interaction; (2) confidence in writing; (3) knowledge sharing; (4) improvement in writing; and (5) motivation.

Improvement in writing. The definition of the term improvement according to Merriam-Webster Online (2017) is "the act or process to enhance in value or quality", or in short, to make something better. On the other hand, the word writing according to Merriam-Webster Online (2017) can be defined as "a style or form of composition." Therefore, the term improvement in writing can be defined as the process of enhancing the composition value or quality.

In the context of this study, the term improvement in writing can be seen through the students' writing task, or composition of their course assignment or activities, particularly in the class Wiki. The process of writing involves adding, editing, or deleting text in the class Wiki. The term improvement in writing is derived from one of the five (5) pedagogical benefits of Wiki, which are: (1) improvement in writing; (2) confidence in writing; (3) knowledge sharing; (4) group interaction; and (4) motivation.

Knowledge sharing. The term knowledge sharing can be defined as an exchange of knowledge between two or more individuals, where one person communicates the knowledge and the other person assimilates it (Schwartz, 2006). In addition, knowledge sharing presumes a relation between at least two parties, where the first party communicate knowledge, in forms of speech or writing, while the other

party should be able to perceive the knowledge and make sense of them (Hendriks, 1999, p. 92).

In the context of this study, the term knowledge sharing can be achieved through the form of collaborative learning, particularly when students learn using Wiki. In the context of this study, Wiki is used as a medium or tool for the knowledge sharing effort to occur among students and also the course instructor. The knowledge sharing process can be achieved by constructing and the sharing of knowledge among students or with the course instructor. The term knowledge sharing is derived from one of the five (5) pedagogical benefits of Wiki, which are: (1) knowledge sharing; (2) confidence in writing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Lecturer influence. The term lecturer influence, or LI, can be defined as how strong the effect of a course instructor, or lecturer can have towards the students. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), lecturer influence (LI), or sometimes referred to as superior influence, is one of the measures that determine subjective norm (SN). Subjective norm (SN), as stated by Taylor and Todd (1995), "is formed by an individual's normative belief concerning a particular referent weighted by the motivation to comply with that referent" (p. 149).

In the context of this study, the term lecturer influence refers to how the course lecturer, who is the superior of the subject, may affect students' intention to adopt the use of Wiki for their learning. Comments, opinions, and suggestions from the lecturer may have an impact towards students' decision to use or not to use technology for their learning purposes.

Motivation. The term motivation according to BusinessDictionary Online (2017) can be defined as "the internal and external factors that stimulate desire and energy in people to be continually interested and committed to a job, role or subject, or to make an effort to attain a goal." Various factors may contribute to students' motivation in a classroom situation, for instance, the teacher, class atmosphere, course content, materials, facilities, as well as personal characteristics of the student (Gardner, 2007, p. 11)

In the context of study, the term motivation is highly related to the course learning motivation, especially when using Wiki for their teaching and learning process. Students' motivation can be seen through their enjoyment, improvement in writing interest, increase participation, as well as contribution in the class Wiki.

Students who are highly motivated will be more interested and committed to their learning. On the other hand, students who are lack of motivation are less interested and will participate less in the course activities. The term motivation is derived from one of the five (5) pedagogical benefits of Wiki, which are: (1) motivation; (2) confidence in writing; (3) knowledge sharing; (4) improvement in writing; and (5) group interaction.

Peer influence. The term peer influence, or PI, which is sometimes referred as peer pressure, can be defined as the social pressure which could change an individual's behaviour or thinking according their peers. The term 'peer' refers to individuals from similar age group or members of a certain group that an individual may belong to. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), peer influence (PI) has been found to have an impact to behavioural intention (INT) through subjective norm (SN).

In the context of this study, the term peer influence refers to the effect of an individual's course mate towards their positivity or inclination in using Wiki for teaching and learning purposes. For instance, a student may believe that her course mates think that she should use Wiki for her learning. This may result in the student's inclination to use Wiki for her learning. On the other hand, a student may believe that her course mates do not think that she should use Wiki for her learning. This may result in the student's resistance in using Wiki for her learning.

Perceived behavioural control. According to Ajzen (1991), the term perceived behavioural control, or PBC, can be defined as "the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (p. 188).

On the other hand, Taylor and Todd (1995) stated that perceived behavioural control "reflects an individual's belief regarding access to resources and opportunities needed to perform a behavior, or alternatively, to the internal and external factors that may impede performance of the behavior" (p. 150). Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), perceived behavioural control (PBC) is one of the three (3) determinants of behavioural intention, other than attitude and subjective norm.

In the context of this study, perceived behavioural control (PBC) are reflected by students' beliefs in regards to the availability of resources and opportunity for them to use Wiki successfully throughout the course. It is hypothesized to be measured by self-efficacy (SE), technology facilitating condition (TFC), and resource facilitating condition (RFC).

Perceived usefulness. The term perceived usefulness, or PU, according to Davis, Bagozzi and Warshaw (1989) can be defined as "the user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p. 985). It refers to a person's perception about the usefulness or practicality of a technology in helping him to perform his or her tasks. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), perceived usefulness (PU) is one of the determinants of attitude (ATT) towards usage intention (INT).

In the context of this study, perceived usefulness (PU) denotes how useful and how helpful students feel that Wiki could help them perform better in their learning process. If the learner feels that Wiki is useful in helping him or her to progress well in the course, there is a higher probability that the student will adopt Wiki. On the other hand, if the learner feel that Wiki is not helping him or her to progress well in the course, there is a lower probability that the student will adopt Wiki.

Resource facilitating condition. The word resource according to Merriam-Webster Online (2017) can be defined as "a source of supply or support". Meanwhile, the term facilitating condition according to Triandis (1979) is "the availability of resources needed to engage in a behavior, such as time, money or other specialized resources" (as cited in Taylor & Todd, 1995, p. 150). Therefore, the term resource facilitating condition, or RFC, is the availability of resources needed to perform a certain task or behaviour, such as time, money, or environment.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), resource facilitating condition (RFC) is one of the determinants of perceived behavioural control (PBC) towards usage intention (INT). In the context of

this study, resource facilitating condition refers to the availability of needed resources, such as a good classroom environment equipped with computers and Internet in order for students to be able to use Wiki smoothly and successfully for their learning process.

Self-efficacy. The term self-efficacy, or SE, can be described as a person's confidence of his ability to perform a behaviour. Self-efficacy is defined as one's belief in his or her own capability to execute or carry out a certain task successfully (Bandura, 1994). This belief determines how people feel, think and behave. A high level of self-efficacy indicates that the person is confident of doing a certain task successfully would have a higher probability of attempting to do the task. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), self-efficacy (SE) is one of the determinants of perceived behavioural control (PBC) towards usage intention (INT).

In the context of this study, the term self-efficacy refers to how confident a student with their own ability in using Wiki for teaching and learning purposes. If the student is confident of his or her own ability to use Wiki and have high level of self-efficacy, there is a higher possibility that the student will adopt the Wiki usage. On the other hand, if the student have low level of self-efficacy and is not too confident of his or her own ability to use Wiki successfully, he or she may have a lower probability of attempting to adopt Wiki for her learning.

Social influence. The word social according to Merriam-Webster Online (2017) can be defined as "of relating to human society, the interaction of the individual and the group, or the welfare of human beings as members of society." On the other hand, the definition of influence according to Merriam-Webster Online (2017) is "the

act or power of producing an effect without apparent exertion of force or direct exercise of command."

Therefore, the term social influence refers to how individual's behavior is influenced by other people's views, either they should or should not perform that particular behaviour. The term social influence has the same meaning with the term subjective norm in the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995).

In this study, social influence (SI) refers to how people who are influential and important to the students, think that a particular behaviour should or should not be executed. This study decomposes social influence (SI) into two groups according to their social circle. The two groups are lecturer influence (LI) and peer influence (PI).

Technology facilitating condition. The term technology facilitating condition, or TFC, can be described as the availability of technological facilities needed to successfully perform a certain task or behaviour. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), technology facilitating condition (TFC) is one of the determinants of perceived behavioural control (PBC) towards usage intention (INT).

In the context of this study, the term technology facilitating condition (TFC) refers to the availability of needed technology to run Wiki successfully for the teaching and learning process to occur, for instance access to compatible computers and good Internet connection. According to Taylor and Todd (1995), "the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage" (p. 153).

Web-based collaboration tool. The term web-based collaboration tool, or also referred to as Web 2.0 tool, can be described as the software designed for users to get together in an online environment or computers that are networked together and achieve a common goal in the teaching and learning process (Boulos, Maramba & Wheeler, 2006).

When using the web-based collaboration tool, learners can communicate, work together, and share information, as well as documents with each other using the World Wide Web (www) as the platform. Web-based collaboration tool can be used either synchronously or asynchronously. When used synchronously, students work together in the web-based collaboration tool simultaneously at the same time. On the other hand, when used asynchronously, students work in the web-based collaboration tool at a different time. A few examples of web-based collaborative tools available are online discussion boards, forums, Wiki, chat room, blogs and social networking tools.

In the context of this study, the web-based collaboration tool used was Wiki. Wiki is a simple set of web-pages where learners and instructor are able to work together and collaborate with each other without the need to have an advanced skill of technological knowledge. Wiki allows user to add and edit content via a simple what you see is what you get (WYSIWYG) interface which makes it a suitable tool to be adapted into the classroom lesson.

Wiki. Wiki is an asynchronous and simple web-based collaborative authoring system, which can be defined as a webpage or set of web pages that can be easily edited by anyone who is allowed access (Ebersbach, Glaser & Heigl, 2006, as cited in Anderson, 2007). According to Wheeler, Yeomans and Wheeler (2008), "the word Wiki comes from the Hawaiian term *wiki wiki* which is translated as 'to hurry', in

which it was due to the idea that Wikis enable rapid and easy authoring direct to the Web" (p. 989).

In the context of this study, the Wiki used is PBworks (www.pbworks.com). It is an open-sourced, simple web pages where the learners and instructor can work together in a fast and simple way to collaborate with each other. Wiki is easy to use and do not require a Hyper Text Markup Language (HTML) coding for users to be able to write in it. This means that user do not need to have an extensive technological knowledge in order to operate Wiki.

The interface of Wiki looks like a set of web pages, and user can access Wiki through the web browser. Browser-based access means that neither a special software nor a third-party web master is needed for users to post content in Wiki (Schwartz, Clark, Cossarin & Rudolph, 2004). In addition, Wiki also enable the facilitation of information sharing and is useful to be used for collaboration purposes. This means that Wiki is also useful to be repurposed and adapted for educational purposes.

Limitations of Study

There were several notable limitations and constraints that were observed in regards to this study. The first limitation was due to the small scope of study. In this study, the sample size was only limited to participants in an undergraduate course from a public university. In addition, the course is conducted in a blended learning form, where the Wiki technology is used together to complement the face-to-face instruction and also outside of the classroom. The generalizability of this study is only limited to students who enrolled in similar courses and form of learning. Therefore, results from the findings of this study need careful interpretation due to the generalizability issues.

The second limitation of the study was that on the learners' participation part. The learners' weekly participation in the class Wiki was self-assessed, in which it was based on the learners' own assumption on how much they take part in the activities given to them by the course instructor. The students' self-assessment may resulted in different opinions and ideas from their own perspectives on how much contributions that they have made weekly in the course Wiki. This is because, one student may think that he or she has made plenty of contributions to the class Wiki, whilst another student may think that he or she has made only a little contributions to the class Wiki. However, in reality, both students may have made the same amount of contributions to the class Wiki. Therefore, the findings of this study may not truly reflect students' actual Wiki usage and participations during the course.

The third limitation of this study was it did not take into account on how students collaborate and communicate using the class Wiki. Their Wiki logs were only briefly examined and monitored by the course instructor and researcher but were not inspected and analyzed word-by-word. As this study was conducted in Malaysia, the way of communication and collaboration may be influenced by local eastern culture and style. Their communication styles may differ from their western counterparts. Therefore, the findings of this study may be limited in that aspect where the way users communicate and collaborate with each other were not examined in-depth.

The fourth limitation was that the course participants were divided into three different groups and were taught by three different instructors, as determined by the faculty. Although all three groups' participants were using the same course materials, resources, class activities and also the class Wiki, however, the three course instructors may have different teaching styles. This may resulted in different outcomes on the students' perceptions of the course session due to these differences.

Finally, the use of Wiki for collaboration in the course was mandatory. Students were given assignments and tasks to be completed in the course Wiki, therefore they do not have option to choose whether to use Wiki or not. It was also not known whether students' participation in the course Wiki was due to their own preference and inclination towards the tool or solely because they need to complete their assignments and tasks. Therefore, caution should be taken when generalizing findings to other settings where using Wiki by the students is by voluntary basis instead of mandatory. This is because different opinions and perceptions from students may result from this.

Summary of Chapter

This chapter focused on the background of the study, particularly regarding the use of technology in the teaching and learning process. Web-based instruction opens up the society to a vast opportunity and possibility towards the educational field. Although technology offers the society with various possibilities, however, the implementation of the use of technology in educational system has not been without any issues as many still prefers the traditional learning setting.

Therefore, through this study, it was hoped that it will contribute a greater understanding to the educational communities whether students find using as beneficial to their learning when online activities are conducted to supplement the face-to-face meeting. In addition, this study also aimed to predict factors that relate to students' intention to adopt the use of Wiki for teaching and learning purposes. Subsequently, the factors that best predict students' intention to use Wiki in the future were then further explored.

In the next chapter, which is Chapter 2, various literatures regarding the use of web-based collaboration tool, particularly Wiki for educational purposes were discussed. This is to enlighten the concept and provide an in-depth understanding based on the studies that have been conducted in the past in regards to the use the tool. In addition, the subsequent section also reviewed findings from past literatures about the usage of Wiki in various educational context, ranging from primary, secondary, and also tertiary education level. Additionally, the literature review section also discussed the theoretical and the conceptual framework that became the basis of this study.

CHAPTER 2

LITERATURE REVIEW

Introduction

This literature review chapter revised several past as well as recent studies that addressed the issues regarding the use of web-based collaboration tool for teaching and learning purposes. Additionally, this section also reviewed findings from past literatures, particularly about the usage of one particular type of web-based collaborative tool that was used in this study, which is Wiki.

The literatures covers studies from various educational context ranging from primary school, secondary school, and also the higher educational level. In addition, the literature review section also discussed the theoretical framework that became the basis that guide this study. Based on the theoretical framework, a conceptual framework was developed that became a guide for this research.

Review of Related Literatures

In today's world of evolving technology, there is a need for people especially students and educators to be more open and adaptive to new technologies. With the rapid evolution of web technologies, there is a potential and possibility of integrating the use of technology in teaching and learning due to its flexibility and advantages it can offer. The explosion of various digital technologies such as computers, smartphones, and tablets which are equipped with the Internet transforms the way people communicate and acquire knowledge.

With the availability of various technological tools, there is a need for the society to grab the chance and opportunity to learn in a new and transformative way. The Malaysian government has introduced various initiatives to facilitate the greater adoption of technology to improve capabilities in every field. The initiatives includes the education field, which changes the culture and practices of Malaysian educational system, moving away from memory-based learning to an education that stimulates thinking, creativity, capability to cater to individual abilities, and learning styles (Ismail, n.d.)

Therefore, students at various higher learning institutions should be able to understand the importance of new technology adoption and exploitation because when the adoption habit is instilled in students from an early age, their receptiveness later on will be much more enhanced (Ramayah & Aafaqi, 2004). Students need to change their mindset and be more open to new changes, in order for them to meet the need of the twenty first (21st) century skills such as creative thinking, communication skills, and critical thinking.

However, the focus is not only on the students, but also course instructors because they need to be more competitive with the challenges of the fast changing world of the twenty first (21st) century. Moreover, students and course instructors need to prepare themselves to face the increased learning standards and performance expectations. With the statistics of internet penetration in Malaysia being the seventh highest penetration rate amongst Asian countries, which stands at 68.5%, this puts the country in a good position to harness the power of online learning (Malaysian Communications and Multimedia Commission, 2016a; Ministry of Education Malaysia, 2015b).

There are many ways educational institutions and course instructors can encourage students to adopt the use of new technologies in their learning journey and enhance their learning experience. One of it is by incorporating the use of technology in the teaching and learning session. Online learning or learning using technology can be applied as an integral component of the teaching learning process.

As suggested by Garrison (2011), learning with technology is an open system, and with the power of the Internet, the teaching and learning transaction is exposed to unfathomable amounts of information. With the vast and growing amount of information and knowledge available through the use of technology such as the Web 2.0, students and educators should be more adaptive and use its potential and strength to help promote the teaching and learning process.

Web 2.0 and Collaborative Learning

In this digital era of the twenty-first century world, the use of Web technologies particularly Web 2.0, has fast gained its popularity as an alternative way of teaching and learning. This type of learning is called electronic learning or in short, e-learning. Clark and Mayer (2003) stated that e-learning can be defined by "any type of learning and instruction which involves the use of materials delivered via computer, or computer-based environments which intended to promote learning" (as cited in Mayer, 2003, p. 298).

Electronic communications technologies, with their multiple text, visual, voice, and their capacity to extend interaction over time and distance, are transforming the teaching and learning process (Garrison, 2011). However, the concept of e-learning do not solely fall on the idea of adding a technology blindly into the lesson content. As suggested by Garrison (2011), it makes little sense to replicate or simulate

traditional face-to-face approaches, where by doing that, not only the opportunities to improve the learning experience would be lost, but the act of merely simulating the traditional practices with technology resists capitalizing on the characteristics of a new era of learning (p. 52).

The fundamental part of learning with technology is the quality of the students' learning experience. Therefore, it is important for course instructors to carefully integrate and plan the lesson well to be incorporated with the technology. Furthermore, Garrison (2011) also stated that the content of an educational experience alone will not define the quality of learning, but it is the context and how teachers design the experience and interactions that drive the learning transaction which is important for a successful e-learning to happen.

Mayer (2003) also pointed out the fundamental aspect of the success of an e-learning in which it depends on "the instructional material being presented using effective instructional methods" (p. 298). Therefore, using e-learning method is intended to help enhance the learning process and also to help students achieve the learning objectives. This is because of the ability of e-learning to transform education in ways that extend beyond the efficient delivery or entertainment value of traditional approaches (Garrison, 2011).

One of the ways to employ the e-learning method in the teaching and learning environment is by utilizing the Web 2.0 technology into the lesson. The definition of Web 2.0, according to Murugesan (2007) is "the second phase in the Web's evolution, where it harnesses the Web in a more interactive and collaborative manner, emphasizing peers' social interaction and collective intelligence, and presents new opportunities for leveraging the Web and engaging its users more effectively" (p.34).

The dynamic nature of Web 2.0 and its ability to support interactivity among users opens up the potential for it to be used in educational practices.

Franklin and Harmelen (2007) viewed Web 2.0 as a technology with profound potential for inducing change in the higher education sector due to the possible realms of learning to be opened up by the catalytic effects of Web 2.0 and allowing greater student independence as well as autonomy, greater collaboration, and also increased pedagogic efficiency. Examples of popular Web 2.0 technologies available nowadays are blogs, Wikis, social bookmarking, media-sharing services, and social networking system.

In addition, Murugesan (2007) also emphasized that "Web 2.0 provides a rich, responsive user interface, and facilitates collaborative content creation and modification" (p.35). Likewise, Franklin and Harmelen (2007) stated that Web 2.0 encompasses a variety of different meanings that include an increased emphasis on user generated content, data and content sharing, collaborative effort, together with the use of various kinds of social software, with new ways of interacting with web-based applications, and the use of the web as a platform for generating, repurposing and consuming content.

These key characteristics of Web 2.0 are the important factors to be considered when implementing the use of it for collaboration purposes in teaching and learning. Due to this, Web 2.0 is also called "people-centric Web, or read/write Web" (Murugesan, 2007, p.34). This is because in Web 2.0, user is the main contributor and also the consumer of the content. This means that user work collaboratively with each other in a shared effort to produce contents when working on the Web 2.0. The characteristic of Web 2.0 enable the process of data sharing using the web browser as a platform enable users to socialize, collaborate, and work with each other.

O'Reilly (2007) outlined and listed seven core principles and features of Web 2.0, and the characteristics were as follows:

1. services, not packaged software, with cost-effective scalability;
2. control over unique, hard-to-create data sources that gets richer as more people use them;
3. trusting users as co-developers;
4. harnessing collective intelligence;
5. leveraging the long tail through customer self-service;
6. software above the level of a single device; and
7. lightweight user interfaces, development models, and business models. (p. 36).

The Web 2.0 technology provides the society with an innovative learning environment which expands the possibilities of interaction, knowledge-sharing, and facilitates the learning activities. Using the tool, learners as well as the instructor can communicate, share information, documents, and work together with each other in a virtual environment regardless of their geographical location. With a myriad of Web 2.0 tools available on the web, educators can make use of the tools to facilitate and enhance the teaching and learning process.

The availability of Web 2.0 technologies can be utilized to accommodate interactions. Interactions can happen synchronous or asynchronously, where students will work together in a shared virtual environment. In a synchronous or real-time environment, everyone meets online at the same time and place. On the other hand, in an asynchronous environment, the course components are available for learners 24 hours a day and can be accessed at the learner's convenience, and are time-zone dependence (Simonson et al., 2007).

This type of environment adds flexibility in terms of time and space for collaborative learning to take place. This is because, learners do not have to be physically present in the faculty to learn, and this proves to be one of the advantages of these technologies for learners who are geographically distributed (Resta & Laferrière, 2007). Therefore, students can learn and access information regardless of their geographical location and time, in which it can be beneficial for them because learning is not only confined during classroom hours. This is especially useful for higher educational learners, particularly part-time learners, where they can set their learning time anywhere and anytime according to their own convenience.

Collaborative Learning and the Social Constructivism Theory

There are many dominant learning theories available which has implications of the implementation of learning and instruction. Examples of various learning theories are Behaviourism, which was pioneered by B.F. Skinner, Cognitivism, which was pioneered by Jean Piaget, and Constructivism, pioneered by Lev Vygotsky. The concept of collaborative learning applies the theory of social constructivism which is pioneered by Lev Vygotsky (Ernest, 1994; Kim, 2001).

The social constructivism theory emphasizes on the social and cultural context, and constructing knowledge based on a person's understanding (Kim, 2001). Based on the perspective of social constructivists, learning occurs when knowledge is mutually built and constructed. Therefore, according to social constructivists, learning is an active and constructive process. The locus of learning in social constructivism is the connection between learners and their environment. This is because according to constructivism theory, the centre of instruction is the learner, and meaningful

understanding occurs when students develop effective ways to resolve problematic situations, especially in real-world contexts (Karagiorgi & Symeou, 2005).

The theory of constructivism considers the engagement of students in meaningful experiences as the core essence of experiential learning, shifting from passive transfer of information to active problem solving and discovery (Smaldino et al., 2012). Through this perspective, students create their own interpretations of the knowledge from the various information that they have received from the environment. Constructivists argued that students situate the learning experience within their own experience and the main goal of instruction is not to directly transfer information, but to create conditions in which students can interpret information for their own understanding (Smaldino et al., 2012). The theory of constructivism focuses on learning rather than instruction, where learners have more control in this environment compared to the instructor (Lefoe, 1998).

According to Vygotsky's view, "all human learning and development is bound up in purposeful actions mediated by various tools, and the most important of these tools was language, which was the basis of human intellect (Vygotsky, 1978, as cited in Warschauer, 1997, p. 3). Students construct their knowledge by actively participating in their own learning process and sharing it with their peers rather than passively receiving the knowledge from the teacher. In addition, social constructivist perspectives focus on the interdependence of social and individual processes in the co-construction of knowledge (Palincsar, 1998). Learning happens when learners build their own personal interpretation of the knowledge based on their experience and interaction with others.

Social constructivists view learning as a social process, where meaningful learning occurs when individuals are engaged in social activities (Kim, 2001). In addition Hyslop-Margison and Strobel (2007), emphasized that teaching and learning approaches which was based on the social constructivism theory should maintain that knowledge is a socially negotiated product. This proves that the theory stands on the idea that learning occurs actively when people are engaged in social activities and through interactions instead of learners receiving the knowledge passively from the instructor. Therefore, in the process of transmitting and sharing of knowledge, the most important aspect is interaction or communication between the individuals. Garrison (2011) also pointed the importance of interaction, where it was stated that "communication is at the heart of all forms of educational interaction" (p. 52).

The impact of social constructivism theory has causes the educational society to recognize the power of peer-to-peer interactions and the community in learning (Jones & Brader-Araje, 2002). From social constructivist perspectives, interactions, such as those achieved through peer interactions are thought to provide mechanisms for enhancing higher-order thinking skills (Palincsar, 1998).

Due to these social factors, this resulted in course designers and instructor to shift away from the traditional method of passive teaching towards a more active learning community where learners actively collaborate with each other in order to construct meaning out of it and construct their own knowledge. When learners with different skills and ideas interact and collaborate with each other, they could share various ideas and perspectives, thus arriving at a shared understanding of a specific field or goal. This implies that the learners not only are responsible for their own learning, but for one another's learning too.

In social constructivist learning method, the role of teachers or instructors are switched from the knowledge transmitter to a facilitator where they assist students in building their knowledge instead of solely providing the content knowledge. Baumann (1998) described the traditional role of teacher as "reasonably formal manner, tells, shows, models, demonstrates, teaches the skill to be learned, in command of the learning situation, and leads the lesson" (as cited in Palincsar, 1998, p. 347). In addition, the traditional role of a teacher is those who controls the pace of the classroom, as well as the content of the lesson.

Although students are active participants of their learning according to the theory of social constructivism, however, the role of course instructor remains pivotal. In the social constructivist learning method, the role of teachers and instructors are to provide students with ways to assemble knowledge rather than to dispense facts (Smaldino et al., 2012). They are the one who guides the students and ensure that they remain in track of their learning. In addition, the type of teacher's interactions are more facilitative rather than directive as compared to traditional face-to-face instruction (Palincsar, 1998).

On the other hand, it also establish opportunities for students to be in control of their learning and become active participants of their knowledge construction. Additionally, the role of instructor in a social constructivist learning environment is to create instructional activities that will improve students' capacity to both generate knowledge and to work together with their peers to create a productive social and intellectual relationship, constructing knowledge in the academic, social, and personal domain simultaneously (Joyce, Weil & Calhoun, 2004). Other than that, this method of instruction put less emphasis on the sequence of instruction, but in turn emphasize more on the design of the learning environment.

In support to students as co-constructors of knowledge, Vygotsky (1978) introduced the construct of the zone of proximal development (ZPD) as a fundamentally new approach to the problem that learning should be matched in some manner with the child's level of development (Palincsar, 1998). As suggested by Vygotsky (1978), zone of proximal development (ZPD) can be seen as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Palincsar, 1998, p. 353).

In short, zone of proximal development (ZPD) is the difference in the ability of what a learner can do herself without assistance, and what she is able to do with the assistance of others. This concept emphasized the aspect of peer-to-peer learning and mentoring where students do not progress through their learning individually, but with the help and assistance of others. This can be achieved through collaborative learning where students actively learn and interact with others to co-construct their knowledge. Therefore, knowledge is based on students' productive interaction and active experience with the real world.

Jonassen (2000) summarized that learners who learn in an online learning setting use technologies as intellectual partners in order to:

1. articulate what they know;
2. reflect on what they have learned;
3. support the internal negotiation of meaning making;
4. construct personal representations of meaning; and
5. support intentional mindful thinking (p. 24).

With the importance of peer interactions in developing knowledge constructions in a collaborative learning environment, it is crucial that teachers and instructors to prepare students on how to collaborate with each other. Students need to be prepared to learn how to collaborate and interact with others. As suggested by Webb and Farivar (1997), the components of intervention includes:

1. engaging students in activities to ensure that they know each other. For example, an ice-breaking session at the beginning of the class semester;
2. teaching communication skills, such as norms for interactions, as well as guidelines on how to communicate with each other;
3. devising activities designed to develop students' abilities to help one another while working on problems; and
4. developing skills for generating explanations (Palincsar, 1998).

When students are more prepared with the skills to collaborate, they could use their communications skills to interact with each other in a more effective way, thus increasing the knowledge sharing effort, which in turn will enhance the teaching and learning process. This was further agreed by Palincsar (1998), where the process of learning is thought to occur through the various act of interaction, negotiation and collaboration among individuals.

Wiki as a Mean to Support Collaboration

With the myriad of Web 2.0 technologies available on the web, educators and course instructors can utilize the tools to facilitate and enhance the teaching and learning process. One of the web-based collaborative tools available that can be utilized and adapted by teachers and course instructors is Wiki. Although Wiki is not particularly created for educational purposes, however, the tool can be adapted and

utilized by course instructors as well as students, to suit the learning situation and needs.

Wiki is a web-based collaborative authoring tool which was created by Howard Cunningham in 1995 as a way to develop private and public knowledge bases (Leuf & Cunningham, 2001, as cited in Lund, 2008). The word Wiki is derived from the Hawaiian word *wiki wiki* which means 'to hurry' (Wheeler et al., 2008). This is due to the ability of Wiki that allows rapid and easy authoring directly from the web browser. Wiki is an open source web-based collaboration tool, where it is freely available and can be modified by everyone.

Wiki enables user to create a Wiki page, and add, edit, or delete any content in its existing Wiki. Wiki accomplish this by providing users with a simple markup language and a simple mechanism to create new pages and link them into the evolving body of content (Wang & Turner, 2004). Wiki allows user to create and edit Web page content using any browser that supports hyperlinks and has the ability to create new pages and cross links between internal pages (Leuf & Cunningham, 2002). The benefit of Wiki is its simplicity where users can master system functionality in a quick manner, with a user interface functionality in the simplest way possible (Wang & Turner, 2004). This is an advantage of Wiki because user do not need to have extensive technological knowledge to operate it.

One of the most well-known Wiki available on the web is Wikipedia (www.wikipedia.org), which is hosted by a non-profit organization, Wikimedia Foundation. Wikipedia is a free, multilingual online encyclopedia which allows anyone to edit and add information to its page content. Wikipedia holds an open concept where any volunteers around the world are able to contribute to the body of information in the encyclopedia. Other projects by Wikimedia Foundation, which

holds similar concept of using Wiki are Wikibooks (www.wikibooks.org), which is a free open-context textbooks, Wikinews (www.wikinews.org), which is a free newsroom source where users can get latest news, Wikivoyage (www.wikivoyage.org), which is a free online travel guide for travelers, and Wiktionary (www.wiktionary.org), which is a free multilingual online dictionary. To date

Wiki does not require user to have an extensive technological skill in order for them to write or edit the content, thus making it fairly easy for anyone with basic computer literacy to contribute. Another advantage of Wiki is that it runs over the World Wide Web (www) and can be supported by various computer platforms. This does not require user to install any other software, thus increasing the ease of access and usability.

Wiki is a simplification of the process of creating a Hyper Text Markup Language, or HTML, which is the most basic building block of the web that describes and defines the content of a webpage (Parker & Chao, 2007). In addition, the user interface of Wiki is "what you see is what you get" (WYSIWYG), which means that users are allowed to see what the end of the result will look like as it is being created or typed. This means user do not need to have a programming background or the knowledge of layout commands in order to execute the web pages.

Another powerful characteristics of Wiki is that it have a history function, which allows user to check and examine the previous versions of their text, and a rollback function, which enable user to restore previous versions, unlike blogs or other types of Web 2.0 (Andersen, 2007). Furthermore, Wiki is a Hyper Text Markup Language (HTML) web pages in combination with a system that records each individual change that occurs over time, so that at any time a page can be forced to

revert to any of its previous states (Parker & Chao, 2007). In essence, the characteristic of Wiki allows users to monitor the changes that they or others have made in the Wiki page. In addition, Wiki has an auto-save function which saves the users' drafts as they write and edit. This means that users do not have to worry if they accidentally goes offline or do not remember to save their work in progress.

The flexibility of Wiki is one of the many reasons why the tool is useful and suitable to be adapted and used for group works and collaborative learning. According to Larusson and Alterman (2009), the malleability of Wiki enable both teachers and students to do further adaptations to the environment so that it better aligns with the requirements of a particular class or the specifics of a given student or learning activity. Although Wiki was not specifically created for academic purposes, however, the functions could be adapted into educational setting to help accommodate the learning process if used wisely. The flexibility of Wiki also enable users, especially students to customize and control their own working space suitable to their preferences and needs.

These characteristics shows that the nature and fluidity of Wiki enable it to support knowledge construction and knowledge sharing effort among users. This allows the process of collaborative learning to happen, where learners and instructor can work together in Wiki to support their teaching and learning process. Wiki can be used to facilitate computer-supported collaborative learning, and collaborative learning becomes even more powerful when it takes place in the context of community of practice (Parker & Chao, 2007). Wenger (2001) described the definition of community of practice as "a group of people who share an interest in a domain of human endeavor and engage in a process of collective learning that creates bonds between them, such as a tribe, a garage band, a group of engineers working on similar problems" (p. 2).

A community of practice consists of people who are engaged in collective learning in a shared domain, thus, learning becomes a collaborative process of a group (Parker & Chao, 2007). Wiki provides an excellent collaborative environment and is ideal for the concept of community of practice, with an aim of achieving collective applied learning with the expectation that over time expertise in a given subject area is developed, shared, and discussed (Godwin-Jones, 2003). In addition, Wiki may be an ideal place for building communities of practice by creating a collective repository of expertise in a subject area, which is refined over time by the contributions and problem-solving of interested individuals (Schwartz et al., 2004). This particular feature in Wiki distinguishes the concept of communities of practice from other online communities such as chat groups or bulletin boards (Schwartz et al., 2004).

Therefore, Wiki has the ability to serve as a platform for a community of practice. This is because, Wiki has the elements which are essential to a successful community of practice to occur, which includes a virtual presence, a variety of interactions, easy participation, valuable content, connections to a broader subject field, personal and community, identity and interaction, democratic participation, and evolution over time (Wenger, 2001). Wiki may also exhibit some of the elements that Wenger (2001) considers fundamental to the creation of successful communities of practice, which are virtual presence, a variety of interactions, easy participation, valuable content, connections to a broader subject field, personal and community identity and interaction, democratic participation, and evolution over time (Schwartz et al., 2004).

Wiki also has the ability to support collective knowledge effort instead of students learning individually by themselves. Instead of making sense of their learning individually, learners take part in activities which produce collective knowledge

construction among them (Lund, 2008). According to Kirschner, Strijbos, Kerijns and Beers (2004), electronic collaborative learning environments are used based on the intended purpose. For instance, course instructors can use them with different educational approaches and in diverse situations to achieve different learning goals.

This shows that technology alone, especially those that were not specifically designed for academic purposes, may not explicitly has the ability to promote the learning process. However, the most important aspect is how the media or tool is used and applied to its full potential in order for it to suit the academic needs, as well as to achieve the intended learning outcomes at the end of the lesson. Therefore, it is important for course designers and instructors to carefully and efficiently plan the lesson content in order to integrate the technology into the classroom pedagogy effectively in order to promote the students' learning, and finally to achieve the intended learning outcomes at the end.

The lesson should be designed in a way to ensure that the technology, or in this particular case, Wiki, is not just a tool used to obtain a goal at the end but it acts as a collaboration tool where knowledge was formed by the individual as a process rather than a product that is presented by them. This means that knowledge was constructed in the process of interacting, sharing, and collaborating, where learners act together as an equal rather than competing among themselves.

In regard to this, Wiki has the ability to support the collaboration effort and it also could effectively support students' learning and engagement throughout the course (Hughes & Narayan, 2009). Collaborating enhances critical thinking and encourages students to participate actively in their learning process, especially when doing their writing assignments. Therefore the most common pedagogical application of Wiki is supporting writing assignments, whereby by using Wiki as a writing tool

maximizes the advantages of reflection, reviewing, publication, and the ability to observe cumulative written results (Parker & Chao, 2007).

However, De Pedro, Rieradevall, López, Sant, Piñol, Núñez and Llobera (2006) mentioned about one of the drawbacks of Wiki when being used for collaborative writing assignments, where "students need to overcome their reluctance and fear of others reading their work in progress in which they deem as messy or with important gaps, and let others see and modify their works" (p. 15). This is due to the open concept of Wiki where other users are able to see the current page that a student is working at. Additionally, other users can also edit their current page, in which may contribute to the reluctance due to fear or shyness of others to view their unfinished works. Therefore, in order for a successful collaborative writing using Wiki, students must be willing to let others view and contribute changes to their works (Parker & Chao, 2007).

This is because, in Wiki, there is no single knowledge owner, but it stands on the concept of knowledge is owned by all creators (Wagner, 2004). Therefore, it is important for course instructors to inform the students at the beginning of the lesson that the crux of using Wiki is shared knowledge, and everyone needs to be willing to share their work with their peers. Lee (2010) suggested that students need to adopt collective ways of thinking and learn to collaborate with others so that they are ready to work as a team. In addition, students need to learn to have a sense of shared-ownership when writing in Wiki.

In this study, the course employed blended learning as the mode of instruction. Blended learning can be defined as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004). In a blended learning course, learners could experience the best of both worlds,

where they can learn synchronously during face-to-face instruction, and asynchronously, during online lesson. The capability of Internet technology could facilitate a simultaneous independent and collaborative learning experience for the learners where they can learn independently within their own space and time (Garrison & Kanuka, 2004). This could serve as a support and complement the live face-to-face instruction where it could extend the learners learning time, thus enhancing the students' learning experience.

Past Researches Concerning the Implementation of Wiki for Educational Purposes

Many past researches have been conducted on the implementation of Wiki for teaching and learning purposes ranging from primary, secondary, college, and higher educational level (Arevalo, 2013; Altanopoulou, Tselios, Katsanos, Georgoutsou & Panagiotaki, 2015; Basar & Yusop, 2014; Chong et al., 2011; Cole, 2009; Elgort, Smith & Toland, 2008; Franco, 2008; Hughes & Narayan, 2009; Kwan & Yunus, 2015; Li et al., 2010; Li et al., 2012; Miyazoe & Anderson, 2009; Prokofieva, 2013; Singh et al., 2013; Wichadee, 2013; Woo et al., 2011; Yusop & Basar, 2014; Yusop & Siti Mariam, 2016; Zorko, 2009).

This section reviewed and discussed past studies in regards to the use of Wiki in the educational field. The review covered a range of educational courses, but mainly focusing on the usage of Wiki for collaboration and writing purposes. The researches vary from four levels of education, namely elementary, secondary, undergraduate, and postgraduate level. These information were useful in providing the knowledge base to this study.

Elgort et al. (2008) conducted a study on two postgraduate courses where Wiki was used as a platform for students and course instructor to collaborate with each other. These two courses, according to Elgort et al. (2008) "had a substantial group work assignment which could translate well to a Wiki environment" as they were required to produce an assignment about their subject's topic in Wiki.

Result from the study by Elgort et al. (2008) found that although the learners stated that working collaboratively in Wiki provides them with valuable learning experience, however, a number of them preferred, and deemed that they could do better in the assignment if they were to do it individually. Result also showed that learners perceived Wiki as beneficial in assisting their group work, encouraged better individual participation, and was relatively easy to use (Elgort et al., 2008). The study also found that interactions among group member in Wiki enhance the progress of their group work. However, the study failed to provide evidence on the ability of Wiki to facilitate knowledge sharing among the group members.

The study by Franco (2008) examined the use of Wiki among secondary school students in English as a Foreign Language class in Brazil which focused on the peer-correction activity on Wiki. Overall, the learners' attitude towards writing was found to be positive, where learners stated their preference of writing on a Wiki compared to paper. Learners reported that their opportunities in writing were maximized, interest and motivation were increased, writing skills were improved, and they learned cooperatively instead of competing. The result also showed that a majority of learners agreed that they were more aware of the writing process when doing the peer correction activity when using Wiki and there were a progress in their language development.

Hughes and Narayan (2009) explored learners' perception towards Wiki in two courses in a Midwestern university, which consist of both undergraduate and postgraduate participants. Students in the first course were called 'The Glossary Group', where they were required to post and edit original contributions. On the other hand, those in the second course, which were called 'The Assignment Archive Group', were asked to develop, share, and edit project assignments in Wiki.

The result from the study by Hughes and Narayan (2009) provided an insight and perspectives regarding students' collaboration in Wiki. Data from the questionnaire revealed that both groups perceived Wiki as moderately effective in helping learning and engagement with course concepts (Hughes & Narayan, 2009). However, it was found that only 'The Assignment Archive Group' reported more collaboration efforts. The study also found that one of the most important factors which influenced the learners' perception was the technical aspects of Wiki.

The next study was by Zorko (2009) which explored the ways students collaborate using Wiki in an English language course in a Slovenian university. The course was conducted in a blended learning manner. Students were required to work together in small group to solve problems which were related in real-life situation. Questionnaires and interview were used as a mean to elicit feedback from the students.

Result from the study by Zorko (2009) showed the technological characteristics of Wiki, which allows learners to view and compare their work with other groups enable them to learn from each other. The commenting features enable them to see what comments were wrote or received from the teacher and peers, and this were proven useful for them in helping them to learn better. Result also showed that learners agreed that they were motivated to do better in their tasks due to the public nature of Wiki. Encouragements from the instructor were also found to be beneficial

in motivating the learners in their tasks. However, findings from Zorko (2009) found that students have preference for publishing only the finished versions of their products, and dislike presenting a partially-finished products to the audience, hence, the reason for collaborating outside of the Wiki environment.

A study by Li et al. (2010), which investigated learners' and teacher's attitude as well as perception towards Wiki for collaborative writing purposes found that there were improvements in students' writing attitudes after engaging in collaborative writing using Wiki. The data were obtained from elementary school students in a Chinese writing class in China. Wiki was used as a platform for their collaborative writing activity, which were to write a composition in Chinese language.

The study by Li et al. (2010) also found that positive responses were gained from the analysis of questionnaire. It was found that students perceived Wiki as beneficial in facilitating them to write, heightened group interactions, as well as widening the reading audience of their writings. Meanwhile, the interview analysis found that learners perceived Wiki as beneficial in four major aspects, which were learning benefits, where learners reported that their writing ability and interest were improved; group interaction, where they perceived Wiki as beneficial in facilitating collaborative learning in a group; technology advantages, where Wiki facilitated commenting and editing efforts; and audiences, where the availability of people reading their work motivated their writing.

Miyazoe and Anderson (2009) explored the use of forums, blogs, and Wiki in a public university in Tokyo, Japan. The study was conducted in three English language classes which were done in a blended learning mode. Although the paper researched on the usage and learners' perceptions regarding the three collaborative

tools, this research will only focus on the use of Wiki. Students were required to translate passages from English to Japanese collaboratively using Wiki.

The study by Miyazoe and Anderson (2009) also clarified that the utility the students found in each of the online writing tools and observed general success in making qualitative changes in students' writing abilities. The learners perceived that collaboration in Wiki was useful for their language learning and it was well-received by the students. The study also found that Wiki helped develop a positive effect on students' language learning progress.

Woo et al. (2011) explored the benefits as well as challenges in using Wiki for students in a Chinese elementary school in Hong Kong for English language studies. The study looked into the affordances of Wiki which helped scaffold students in conducting their writing activities collaboratively. The class integrated the use of Wiki for its lesson activity with the face-to-face classroom where students will co-construct their writing and exchange comments through the class Wiki. Data were collected from questionnaires, interviews, focus-group discussions, and students' activity which were recorded in the Wiki.

The study by Woo et al. (2011) also found that students developed a generally positive perception towards the use of Wiki for group writing, in terms of enjoyment, Wiki's ability to help promote team work, Wiki's ability to help students write better, and Wiki's commenting feature was useful in helping students' in their writing, as well as collaboration. The result also found that Wiki was beneficial in facilitating interaction, where students could share ideas among group members, as well as the teacher (Woo et al., 2011). Furthermore, Woo et al. (2011) highlighted the three key affordances of Wiki based on the study. They were educational, social or collaborative,

and technological factors, where they were found to be helpful in promoting students' learning progress.

Chong et al. (2011) explored the use of Wiki for a group of secondary school students in Malaysia to work collaboratively in writing a science dictionary. The course activities involved the participants to construct a dictionary, which still requires the learners to exhibit their writing skills and produce it in English. The study explored the learners' perception of Wiki and the effects of Wiki on their collaborative efforts in the group activity by using both questionnaire and interview for data collection. Result from the study by Chong et al. (2011) showed that a majority of learners had positive perceptions towards Wiki. It was found that the learners were able to learn and improve their English language by working collaboratively, as well as helping them to gain new vocabulary.

The result from the study by Chong et al. (2011) also found that there was a lack of active peer review where students were more eager to work on their own task rather than commenting on their peers' work. Data from the interview revealed that students would read their peers' latest work before they start their own writing, where the combined reading and writing enable them to enhance their knowledge (Chong et al., 2011). The learners also valued the aspect of teamwork in contributing to the content of their task and comments received from the teacher were deemed important by them. Data also revealed that learners were more sensitive to the spelling and tend to pay more attention to language forms when composing the dictionary.

Another study on Wiki implementation in Malaysian context was conducted by Kwan and Yunus (2015), which explored group participation and interaction when using Wiki for collaborative writing among gifted secondary school students. Result from the study by Kwan and Yunus (2015) also found that interactions that occurred

in the class Wiki helped improved the gifted students' English language learning in many aspects, which includes vocabulary, syntax and grammar, especially from the process of observing better students' writing and exchanging feedback for error correction.

This proved that interactions, be it among students, or with the course instructor is crucial for students' learning development. In addition, by reading not only their own group members' writing, but also reading the other groups' work has aspired the students to write similarly, which in turn improved their writing skills (Kwan & Yunus, 2015). Students also learn by comparing other students' writing with their own by scrutinizing others' language and writing, which in turn improved their writing skills (Kwan & Yunus, 2015).

Although positive results were obtained from many of the past researches concerning Wiki implementation in the classroom (Arevalo, 2013; Basar & Yusop, 2014; Chong et al., 2011; Elgort et al., 2008; Franco, 2008; Hughes & Narayan, 2009; Li et al., 2010; Li et al., 2012; Miyazoe & Anderson, 2009; Prokofieva, 2013; Wichadee, 2013; Woo et al., 2011; Zorko, 2009), however, there were some studies that were reported to be unsuccessful (Cole, 2009; Karasavvidis, 2010; Yusop & Siti Mariam, 2016).

Cole (2009) explored the use of Wiki to support undergraduates' engagement in an information technology course in United Kingdom. The study found a lack of participation from the students in the course, where halfway through the term during the fifth week, there were zero post to the Wiki. The lack of Wiki use was reported due to various reasons, such as "academic pressure from other courses (educational constraint), ease of use concerns (technical constraint), issues of self-confidence (personal constraint), and a total lack of interest" (Cole, 2009, p.144). This study

pointed that students perceived Wiki to have little value and impact as a tool in their learning. However, Cole (2009) found that the fault may not due to the technology but a poorly-designed course. This further resulted in a lack of motivation for the students to use the Wiki technology in their course.

Similar findings were found by Yusop and Siti Mariam (2016), who conducted a study on undergraduates in a public university in Malaysia and found a high-level of resistance by the students in using Wiki for their learning. It was reported that the resistance were due to two major factors, which are: (1) technical factors, such as poor Internet connection outside the classroom and user-friendliness aspects of Wiki; and (2) individual factors, such as anxiety in using new technology, mental perceptions, and lack of student commitment towards learning experiences (Yusop & Siti Mariam, 2016). The issue of a lack of interest from the students was also pointed out by Cole (2009) and Chong et al. (2011), where it became one of the factors of the lack of contribution and participation on the Wiki.

Findings from Chong et al. (2011) also found out that inactive Wiki participants expressed their lack of enjoyment of writing use Wiki. This is because the students do not agree that writing in Wiki would help them much in their learning because they did not enjoy the activity given (Chong et al. 2011). In addition, the idea of exposing their work to others gave the students a sense of fear and a lack of confidence which discouraged them to use Wiki (Chong et al., 2011). This was further agreed by Jung and Suzuki (2015) where most of the inactive participants who made no contributions to the writing or editing process in the group Wiki revealed that it was due to the lack of confidence and to avoid embarrassment.

Another issue emerged from the implementation of Wiki in the classroom was the issue of ownership and intellectual property (Wheeler et al., 2008). Wheeler et al. (2008) investigated the use of Wiki among undergraduates enrolling in the Bachelor of Education with Honours primary education programme. The use of Wiki in the study was primarily as a space to store and edit the work from the students' research assignments and as a forum for discussion among students and course instructor. The findings from Wheeler et al. (2008) found that students tend to be protective to their ideas as their own work, and although they are happy to post their contributions to the class Wiki for other group members to read, however, they are resistant to have their contributions altered or deleted by other group members. Students also insisted to get credits for what they have done and do not want to be acknowledged the product as a group work.

The study from Karasavvidis (2010) found that students complained that participating in the class Wiki can be very demanding, both in terms of time and effort. While it may be true that working on Wiki may require an additional time and effort because students need on top of participating in the traditional classroom lesson, however, it can bring plenty of advantages and potential due to the more participatory role that the students take when working actively on the class Wiki.

Another issue arised from the findings by Wheeler et al. (2008) is relating to students' collaboration, where they tend to read only the pages that they have contributed, and this negate the original objective of collaborative learning through content generation. This issue was also similar from the findings by Karasavvidis (2010), whereby it was found that there was an implicit competition amongst students which can be seen from the product in their Wiki pages. Therefore, it is important for instructors to emphasize on the need to collaborate and promote the concept of shared

meaning making, rather than compete with each other when contributing to the class Wiki. Students need to be informed about the concept of collaborating, which is to achieve the end goal together with their peers to form their knowledge. This is because when students feels that there is a need for them to compete with their peers, it undermined the concept of collaboration.

Benefits of Wiki for Collaborative Writing

Previous literatures suggested that positive responses were gained from students when it comes to the experience of using Wiki for educational purposes (Arevalo, 2013; Altanopoulou et al., 2015; Basar & Yusop, 2014; Biasutti & El-Deghaidy, 2012; Chong et al., 2011; Elgort et al., 2008; Ertmer, Newby, Liu, Tomory, Yu & Lee, 2011; Franco, 2008; Hughes & Narayan, 2009; Kim, Liu, & Bonk, 2005; Kwan & Yunus, 2015; Li et al., 2010; Li et al., 2012; Mak & Coniam, 2008; Miyazoe & Anderson, 2009; Naismith, Lee & Pilkington, 2011; Prokofieva, 2013; Singh et al., 2013; Su & Beaumont; 2010; Wheeler et al., 2008; Wichadee, 2013; Woo et al., 2011; Yusop & Basar, 2014; Zorko, 2009).

Based on the literatures discussed, several advantages were found in regards to the use of Wiki for collaborating and they tend to be interrelated with each other. From the literatures, it was found that Wiki were beneficial in five areas. The first pedagogical benefit of Wiki is its ability in increasing learners' confidence in writing (Basar & Yusop, 2014; Ertmer, Newby, Liu, Tomory, Yu & Lee, 2011; Franco, 2008; Li et al., 2010; Mak & Coniam, 2008; Miyazoe, 2010; Naismith et al., 2011; Singh et al., 2013; Su & Beaumont, 2010; Wichadee, 2013; Woo et al, 2011; Zorko, 2009).

The second pedagogical benefit of Wiki is its ability in facilitating the knowledge sharing process (Basar & Yusop, 2014; Chong et al., 2011; Cole, 2009; Elgort et al., 2008; Li et al., 2010; Naismith et al., 2011; Raman, 2006; Singh et al., 2013; Su & Beaumont; 2010; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009).

Next, the third benefit of Wiki is its ability to increase learners' improvement in their writing process (Altanopoulou et al., 2015; Biasutti & El-Deghaidy, 2012; Chong et al., 2011; Cubric, 2007; Franco, 2008; Kwan & Yunus, 2015; Li et al., 2010; Lund, 2008; Miyazoe & Anderson, 2010; Naismith et al., 2011; Wheeler et al., 2008; Wichadee, 2013; Woo et al., 2011; Zorko, 2009).

Futhermore, the fourth benefit of Wiki is its ability to heightened group interaction (Chong et al., 2011; Franco, 2008; Kim et al., 2005; Li et al., 2010; Li et al., 2012; Raman, 2006; Singh et al., 2013; Su & Beaumont, 2010; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009).

Finally, the fifth pedagogical benefit of Wiki is its ability in facilitating students' motivation (Basar & Yusop, 2014; Elgort et al.; 2008; Franco, 2008; Li et al., 2010; Li et al., 2012; Notari, 2006; Su & Beaumont, 2010; Yusop & Basar, 2014; Wichadee, 2013; Zorko, 2009).

This section of the literature covers the advantages of Wiki for collaborative writing in learning, particularly in terms of confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation.

Confidence in writing. Past studies revealed that Wiki is beneficial in increasing learners' confidence in writing (Basar & Yusop, 2014; Ertmer et al., 2011; Franco, 2008; Li et al., 2010; Li et al., 2012; Mak & Coniam, 2008; Miyazoe, 2010;

Naismith et al., 2011; Singh et al., 2013; Wichadee, 2013; Woo et al, 2011; Zorko, 2009).

According to Woo et al. (2011), reviewing the work of others and receiving comment from peers as well as teacher may help students in their writing progress. When students receive feedbacks and assurance that they are moving in the right direction, it will increase their confidence in doing their task. This claim was also supported by Zorko (2009), where it is also stated that, the ability to receive comments by others helped students to check whether they were moving in the right direction, learn from better groups, or learn from mistakes made by others which could help them not to repeat the same mistake. This is also similar to the findings by Basar and Yusop (2014) where comments received by peers and teacher are able to boost the students' confidence in writing.

Collaborating and learning using Wiki allows learners to become less dependent on the course instructor, and instead, they take on a role of an active learners who are more responsible towards their learning. When collaborating using Wiki in the classroom, learners share the learning responsibility with their peers, and through this, they gain higher degrees of autonomy in the sense that they have to make choices and decisions while writing and providing feedback to others (Franco, 2008). This in turn resulted in an increased confidence in the students.

The comments and criticism received from peers as well as the instructor allow students to learn better from their mistakes. This is also agreed by Chong et al. (2011) where students who did not mind receiving critics perceived Wiki as an interesting tool for collaborative projects to happen. This is because the sharing ideas and by giving as well as receiving critical feedbacks from their peers and teacher could improve their confidence in writing.

However, the findings by Wheeler et al. (2008) found that students initially feel daunted by the prospect of writing publicly on the Web and experienced anxiety about receiving criticism from their peers and other audiences, but the teacher managed to overcome their fears by developing students' confidence through the use of practice simulation using Wiki. Moreover, by collaborating using Wiki, the more knowledgeable students can also help and support their peers to progress in their writing whenever they encounter any issues or difficulties. This is in line with the concept of the zone of proximal development (ZPD) where students progress through their work with the help of a more knowledgeable peers.

Additionally, the students who gives feedbacks and comments to their peers' works are proved to be more critical in their thinking as they evaluate their friends' works. When viewing others' works also enable student to self-reflect on their own writing, as they revise and correct other students' works, thus making Wiki a helpful tool to build students' confidence and foster critical reflection (Lee, 2010). In addition, students are found to be more critical and confident when they give out comments and criticism, as well as accepting criticism from others when working on the task in Wiki (Su & Beaumont, 2010).

The interactions made through the process of commenting on each other's work implies that Wiki has the ability to promote collaborative efforts among students. This claim was further supported by Bradley, Lindström and Rystedt (2010) where it was found that Wiki enable collaborative effort to occur through the process of making comments, giving out ideas, editing text, giving motivation, and making suggestions.

Previous studies found that students produced substantially more text that required in the class Wiki because it can boost their confidence in writing (Basar & Yusop, 2014; Mak & Coniam, 2008). This was further supported by Mak and Coniam

(2008), where it was found that individual's content contributions have lengthened and expanded as they grow in confidence and they are also able to reorganize their original contributions.

Students who are socially introverted may find that online environment are more comfortable to them as compared to participating in face-to-face instruction. Students may become more expressive because of the perception of privacy and the informative nature of mediated communication (Simonson et al., 2007). In addition, in Wiki, students have more time to think and reflect on their answer or work compared to the physical classroom, which in turn giving them a higher sense of confidence in producing their work.

In addition, writing and posting on Wiki can also give students a sense of accomplishment and pride when seeing their product posted on the class Wiki for others to view (Chong et al., 2011). This was further supported from the findings by Mak and Coniam (2008) where students are found to be more creative and confident when they consider having a real audiences looking at the content of their writing, instead of just submitting their work to the course instructor. This resulted in students to be more careful and serious in their writing, considering there are multiple audiences reading their work (Lee, 2010). This shows that Wiki has the ability to provide students a conducive online learning environment which could increase their confidence level to actively take part in the learning activities given to them by the course instructor.

Additionally, when students are more comfortable in using Wiki, and perceived Wiki as easy to use, they are more confident in doing their writing task. As supported by Ertmer et al. (2011), once students have begun their contribution with their team partners, their confidence level also increased as they attributed the success of their writing to their own efforts.

Ertmer el al. (2011) also noted that the expressed satisfaction and confidence from students stems from the sense of achievement, mainly from the feeling of enjoyment from the learning experience. In addition, according to Naismith et al. (2011), students' confidence was also developed from the feeling of being challenged to provide better resources and product which was mainly due to the reason that they are having audiences viewing their work.

Knowledge sharing. Previous studies suggested that Wiki is useful to support collaboration efforts among students (Basar & Yusop, 2014; Biasutti & El-Deghaidy, 2012; Chong et al., 2011; Cole, 2009; Elgort et al, 2008; Hughes & Narayan, 2009; Li et al., 2010; Lund, 2008; Naismith et al., 2011; Notari, 2006; Raman, 2006; Singh et al., 2013; Su & Beaumont, 2011; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009). Knowledge sharing presumes a relation between at least two parties, one that possesses knowledge and the other party that acquires knowledge (Hendriks, 1999). Working collaboratively in a Wiki environment allows the knowledge sharing process to occur as students work together with each other, gather data, share information and ideas to complete their learning tasks.

The educational and social affordances of Wiki allows knowledge sharing effort among users to happen. The Wiki technology thrives on the concept of being an open system which means anyone can add or edit the Wiki page, and share information with others, which is beneficial to support knowledge sharing effort between users (Raman, 2006). Wiki gives students the opportunity to "use an online dictionary, extract main ideas from the Internet, critically evaluating suitable information for the students to use, and generally learning to write better through sharing and examining examples from other groups" (Woo et al., 2011, p. 53).

This shows that Wiki holds the potential for collective knowledge development where it shows the shift from individual learning to collective knowledge construction and skills (Lund, 2008). The statement was further supported by Biasutti and El-Deghaidy (2012), where online Wiki activities helped students in their sharing of knowledge through the act of teamwork, for instance, through the modification of the work of others, the addition of elements, and the correction of some information. Apart from that, Biasutti and El-Deghaidy (2012) also stressed on the interactivity among students during the process of collaborating in Wiki because it is the most important aspect of the knowledge sharing process.

In addition, Wiki has the ability to provide user a safe and comfortable environment for social interaction, as the privacy setting can be set to either public, protected, or private, as set by the course instructor (Singh et al., 2013). Wichadee (2013) found that students expressed that they could write more freely in their group Wiki compared to face-to-face instruction. By having a secured and safe online learning environment where only the course participants and instructor are present, students can safely share their work, documents, and ideas with their peers in the class Wiki.

Comparing and commenting is important to the learners because not only they can know what others are producing, but it also has a self-evaluation effect because if other contributions have a better quality than their work, they are more motivated to increase the quality of their work (Notari, 2006). As stated in the study by Zorko (2009), the ability to read other group's work as well as receiving comments by others helped students to check whether they were moving in the right direction, learn from better groups, or learn from mistakes made by others which could help them not to repeat the same mistake.

This claim was further agreed by Su and Beaumont (2010), whereby when viewing the work of others, students can learn from others' mistakes and avoid making the same mistakes that others have made, which is especially beneficial for struggling students. In addition, weaker students can easily obtain ideas and inspiration from their peers' work which is available for others to see in the class Wiki (Su & Beaumont, 2010).

The study by Basar and Yusop (2014) also found that students learn better when they read and examine examples from other groups' Wiki page. This claim was further supported by Wichadee (2013) where the study found that students gained extensive knowledge from learning through Wiki where they developed critical thinking skills when expressing ideas and sharing knowledge more often in the class Wiki. As found by Woo et al. (2011), the transparency of sharing information and ideas to other groups in the class Wiki allows students to read the work other groups and make them learn better, which in turn improved their writing and composition.

In addition, Wiki has the ability to provide students and course instructor with an enriched online collaborative environment, which could stimulates students' active participation and meaningful learning (Singh et al., 2013). This shows that the social and collaborative affordances of Wiki allows the knowledge sharing process to occur between users, which in turn enhances their learning progress.

Basar and Yusop (2014) found that students are more careful with their writing knowing that there would be an audience looking at their Wiki pages. This may be a positive sign where the students would want to present their best work for other to view. The claim was further supported by Wheeler et al. (2008) where students are aware of an unseen audience due to the result of having their writing product published on the web, and this resulted in a strong desire to write accurate and relevant content

to the Wiki space. However, not many students agreed that comments received openly in Wiki are useful and beneficial for them (Chong et al., 2011; Cole, 2009). This may result in a lack of participation and contributions from the students in Wiki due to the feeling of fear of making mistakes which can be seen by others.

Hughes & Narayan (2009), recommended future research which includes observation of the courses both in online and face-to-face setting in which the Wikis are used in order to understand the nature of the pedagogy. This is because the study did not incorporate the effect of face-to-face pedagogy in order to understand students' view on how the Wiki may or may not be helping them in collaborating.

Therefore, this study will also take into account the pedagogy in face-to-face lesson when used together with Wiki. This is due to the fact that online collaboration will not happen independently as a different set of lesson, but it helps in scaffolding students during their writing task which is an extension from the face-to-face lesson.

Improvement in writing. Another benefit that were looked into in this thesis is students' perceptions on the ability of Wiki in improving their writing skills when collaborating for learning purposes. Past studies found that Wiki has the ability to increase learners' improvement in their writing skills (Altanopoulou et al., 2015; Biasutti & El-Deghaidy, 2012; Chong et al., 2011; Cubric, 2007; Franco, 2008; Kwan & Yunus, 2015; Lee, 2010; Li et al., 2010; Miyazoe & Anderson, 2010; Wheeler et al., 2008; Wichadee, 2013; Woo et al., 2011; Zorko, 2009).

Woo et al. (2011) studied the potential of using Wiki for primary school students in an English language class and the result showed that students enjoyed using the Wiki for their collaborative work. In addition, it was also found that Wiki helped foster teamwork as well as improved students' writing skills (Woo et al., 2011).

This is also supported by Miyazoe (2009) which observed general success in students' writing abilities when using the Wiki for language learning. Using Wiki in the classroom has reported to show having a significant improvement in learning outcomes, particularly for students with low initial performance (Altanopoulou et al., 2015). This was further proven from the findings by Jung and Suzuki (2015) where the students claimed that they learn more words and expression from their partners, and the Wiki-based collaborative writing and editing process was especially useful for their learning since they were able to understand their peers' ideas and thoughts.

Furthermore, the public nature of Wiki allows peer corrections to happen, where students can view their friends' work and help to correct it. According to Franco (2008), it was found that students who reacted optimistically to peer-correction are more aware of their writing process and further improve their writing ability. This was further supported by Wichadee (2013) where it was found from the study that students' writing score were increased and their writing skills were improved, which was due to the fact that the students realized that their written work was read, reviewed, and corrected by their team members in the group Wiki.

In addition to peer corrections, the study by Cubric (2007) found that students value continuous feedback from the course instructor. In order to increase students' engagement, the course instructor should take a role of an active reviewer, which means they need to actively review and provide feedback to the students. The course instructor could use the commenting feature to provide feedback to the students regarding their writing. Regular feedbacks from the course instructor could increase students' motivation and confidence in writing. Students may perceive the increased and varied interactivity and immediate feedback as a positive input to their learning experience (Simonson et al., 2007).

Interacting and collaborating using Wiki can enhance students' knowledge and improve their writing skills. The process of continuous interaction with other participants in the class Wiki helped them in the process of knowledge acquisition by the exchange of ideas and information with their peers through the comparison of different ideas (Biasutti & El-Deghaidy, 2012). In addition, students who took active participatory role in producing texts in the class Wiki have better reflective and reasoning skills, which in turn enriched their development of knowledge acquisition. This was further supported from the findings by Biasutti and El-Deghaidy (2012), where active students were found to be more stimulated and it helped them in their thinking and writing process.

In addition, the study by Wheeler et al. (2008) reported that students' writing skills had considerably improved as a result of their use of Wiki in for collaboration in the classroom. This is because, the students found that writing on the class Wiki is a challenging activity as compared to doing their writing assignment individually, as it involves more thought about the length and the structure of sentences as it could be read by anyone (Wheeler et al., 2008). Writing collaboratively using Wiki can also enhances students' critical thinking skills.

As found by Wheeler et al. (2008), students reported that they developed a healthy critical and analytical thinking skills as well as writing styles through the use of the shared spaces in Wiki, which is due to looking at other students' opinions and writings which helped them analyzed and question what they are doing. This claim was further supported by the study by Woo et al. (2011) where Wiki was found to have educational affordances, whereby students are able to critically evaluate suitable information extracted from their peers' work in the class Wiki, and they generally learn

to write better composition through the process of sharing and examining examples from other groups.

This was further agreed by the teachers where they noted that students have improved their writing skills and subject knowledge when they read more examples and learn from their peers' work (Woo et al., 2011). When collaborating with their peers, students are more exposed to various writing styles and organization because every students have their own way of writing. After reading and examining various writing examples not only from their own group members, but also from other groups, it helped students to improve their writing skills by scrutinizing others' languages through the process of comparing each other's works (Kwan & Yunus, 2015).

Group interaction. The technological characteristics of Wiki enable it to act as a platform for people to work together in an asynchronous way, which is good for collaborative learning process to happen. Interaction among individuals is seen as the central to an educational experience and is a primary focus in the study of online learning (Garrison & Cleveland-Innes, 2005). Past studies found that Wiki has the ability to heighten group interaction (Chong et al., 2011; Franco, 2008; Kim et al., 2005; Li et al., 2010; Li et al., 2012; Singh et al., 2013; Su & Beaumont, 2010; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009).

Wiki was found to be beneficial in enhancing group interaction and in providing opportunities for students to interact more with the course instructor and their peers (Kim et al., 2005; Zorko, 2009; Li et al., 2010 & Woo et al., 2011). This is because, according to Raman (2006), Wiki has the ability to enhance communication among individuals whereby it provides a common platform and centralized information base to support internal communication between members. Li et al.

(2010) explored students' perception towards collaborative writing using Wiki in a Chinese writing class and reported that students find Wiki is beneficial to heightened group interaction.

Students can learn a lot by interacting with their peers and the interaction among students can further improve their writing ability. The social affordance of Wiki promote a variety of interactions, be it peer-to-peer or student-teacher interactions, which allows the dynamic activities to occur throughout the writing sessions (Singh et al., 2013). It also helped foster teamwork among students (Woo et al., 2011). Instead of making sense of their learning individually, the activity produces collective knowledge construction among students.

When students collaborate with each other in Wiki, they not only developed writing skills but also social skills in the sense that they no longer feel the need to compete with their peers, but learned how to cooperate with each other instead (Franco, 2008). When collaborating using Wiki, the fundamental aspect is by having an equal sense of ownership. Findings by Singh et al. (2013) found that students feel that they have a sense of equal ownership of the end product that they produced in their group Wiki because they created, shared, edited, and made corrections together among themselves.

A study by Zorko (2009), found that Wiki enable to promote collaborative behaviours among students, such as learning from each other, as well as communicating with the teacher. The findings by Zorko (2009) also found that Wiki helped the students to communicate more effectively with their teacher, where the immediate feedbacks received from the teacher helped them progress with their work faster. This shows that Wiki the feature in Wiki encourages communication between

learners as well as the instructor. Interactions are important while working collaboratively as it could act as a source of motivation for learners (Franco, 2008).

This is especially beneficial and helpful for students who are generally shy and have difficulties speaking in public to voice out their opinions and comments. This claim was supported from the findings by Woo et al. (2011) whereby it is easier for students to share what they think and also share their ideas in Wiki, and teachers discovered that even the shy students contributed and commented significantly more in the class Wiki as compared to talking verbally in class.

Wiki can be used for teaching and learning purposes due to the easy integration and with appropriate scaffolding to guide students in posting constructive comments and by giving feedback (Woo et al., 2011). This not only applies to the students, but also from the instructor's side, where he or she could interact with students virtually and provides feedback to them to increase their motivation. Wheeler et al. (2008) found that Wiki has social and collaborative affordances where students cited the usefulness of peer commenting through the Wiki platform, in which it encourages interaction among group members. One of the conditions for effective feedback is timeliness, and compared with the traditional way of exchanging feedback and comments, it was found that Wiki made the process easier and quicker (Su & Beaumont, 2010).

A study by Kim et al. (2005) found that students perceived online learning as beneficial because it allows them to interact with their instructor more closely than they could in traditional classroom environment. The students also agreed that by interacting with their peers and instructor, a more meaningful learning experience could be achieved. One of the most effective techniques that course instructors could

do to promote interaction in Wiki is by using the commenting feature and make a threaded discussion so that students could join in and participate.

Motivation. Previous studies suggested that using Wiki can help facilitate students' motivation (Basar & Yusop, 2014; Elgort et al.; 2008; Franco, 2008; Lee, 2010; Li et al., 2010; Li et al., 2012; Notari, 2006; Su & Beaumont, 2010; Yusop & Basar, 2014; Wichadee, 2013; Zorko, 2009). A study by Li et al. (2010) found that a majority of students became more interested in writing and improvements in their writing attitudes were found after engaging in collaborative writing when using Wiki. Students perceived that Wiki is beneficial in facilitating their motivation to write (Li et al., 2010).

This claim was further supported from the findings by Elgort et al. (2008) where Wiki was found to be beneficial in motivating students due to the technology to new and able to caught students' attention as well as interest to use it for their learning process. In addition, the ease of use of Wiki technology was proven to be a source of motivation for students to adopt its usage for their academic assignments (Elgort et al., 2008). This was further supported by Su and Beaumont (2010), whereby it was found that students' first impression towards Wiki for its ease of use and user-friendliness increases students' motivation to use it.

Students' motivational factor also affects their involvement in the web-based collaboration environment. If the students are not motivated or do not feel that their presence are appreciated by others, they are less likely to participate in the discussions (Franco, 2008). A study by Lee (2010) found that Wiki has the ability to increase students' motivation in doing their tasks when meaningful interaction and collaboration occurs during the writing task.

In Wiki, students not only collaborate with their group members, but they can also view the work of others and discuss with other groups, in the form of comments with the availability of the commenting feature. The visibility of group Wiki, where everyone could view each other's work is one of the factors that could encourage learners to be more active in their task. This in turn, could increase students' motivation. This is because, the public nature of Wiki is a strong factor of motivation for students to do better because they learn from others' mistakes and the fact that others too, can see their mistake (Zorko, 2009). Therefore, this study intended to look into students' motivational aspect in terms of enjoyment, improvement in writing interest, motivation to participate and motivation to contribute in the class Wiki.

Factors Influencing Intention to Use Technology for Teaching and Learning

In recent years, there is an increase in the integration of technology in the classroom due to the opportunities and advantages it offers. Hence, it is important for lecturers and course instructors to learn and find out about the factors that may influence students' intention and in turn to adopt the use of technology for their teaching and learning process. The understanding of this factor can help in the effort of promoting the use of technology, particularly the web-based collaborative tool, for teaching and learning process.

Based on past studies, the factors that were found to influence students' intention to adopt the use of technology include attitude, subjective norm, and perceived behavioural control (Ajjan & Hartshorne, 2008; Buchanan, Sainter & Saunders, 2013; Cheung & Vogel; 2013; Cullen & Green, 2011; Park, Nam & Cha, 2012; Sadaf, Newby & Ertmer, 2012; Sadaf, 2013; Smarkola, 2007; Taylor & Todd, 1995; Teo, Lee & Chai, 2007).

Attitude. Attitude can be defined as a person's feelings toward performing a certain behavior and it is assumed that a certain behaviour will lead to certain outcomes (Taylor & Todd, 1995). Several past studies have found that attitude towards the use of technology is one of the important factors in predicting user's intention to adopt the use of technology in teaching and learning (Ajjan & Hartshorne, 2008; Cheung & Vogel; Davis, 1989; Park et al., 2012; Sadaf et al., 2012; Sadaf, 2013; Teo, Lee & Chai, 2007;).

A person's attitude towards technology may act as either a facilitator or barrier to computer use, with consequences for students' learning (Teo et al., 2007). Teo et al. (2007) explored preservice teachers' attitude towards computers in a higher educational institution in Singapore. It was reported that, attitude towards computer is a key determinant of preservice teachers' intention to use computer in their teaching. This was consistent with other previous studies, where attitude is a significant determinant of behavioural intention, which in turn, predicts usage (Cheon, Lee, Crooks & Song, 2012; Cheung & Vogel, 2013; Davis, 1989; Sadaf, 2013; Teo, 2008). This claim was further supported by other studies where it was found that attitude towards technology was the most important construct in explaining the causal process of technology adoption (Park et al., 2012; Sadaf, 2013).

In addition, three (3) factors were found to determine attitude towards technology. The first factor that determines attitude towards technology is perceived ease of use (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Cheung & Vogel, 2013; Shroff, Deneen & Ng, 2011; Smarkola, 2007; Teo et al., 2007). The second factor that determines attitude towards technology is perceived usefulness (Ajjan & Hartshorne, 2008; Buchanan et al., 2013; Guo & Stevens, 2011; Sadaf, 2013; Shroff et al., 2011;

Smarkola, 2007; Teo et al., 2007). Finally, the third factor that determines attitude towards technology is compatibility (Ajjan & Hartshorne; Taylor & Todd, 1995).

Cheon et al. (2012) suggested students who feel that the technology integrated in their lesson as easy to use are more likely to use it for their coursework. The result was further supported by other findings (Ajjan & Hartshorne, 2008; Cheung & Vogel, 2013; Shroff et al., 2011; Smarkola, 2007; Teo et al., 2007) which indicates that individual's self-efficacy towards the technology is positively associated with intention to use technology. Teo et al. (2007) stated that computers and technology are perceived to be useless if a person believe that they do not know how to use them. Therefore, a person's attitude towards the use of technology is influenced by how easy it is to use the tool and they will be reluctant to use it if it seem difficult to use.

Teo et al. (2007) suggested that an active use of the computer strengthened user's perceived usefulness of the computer and promoted the development of positive feelings towards computers. If students perceived that technology is useful, they may have increased intention to use it. This was agreed by Guo and Stevens (2011) where from their study it was found that students who find Wiki to be useful for their learning have more intention to use it in their group collaboration in future courses.

Perceived usefulness of technology tools are is driven by perceived values for improving student engagement, interaction, motivation, comprehension of content, and enhancing the overall learning experience by using innovative learning tools to which students can relate (Sadaf, 2013). Therefore, because perceived usefulness of the technology highly influenced attitude towards the intention to use technology, the meaningful use of these technology for the students' courses would be a key means of persuading students to utilize it (Cheon et al., 2012).

Technology compatibility with intended use was also found to be associated with attitude. Ajjan and Hartshorne (2008) found that perceived compatibility positively affects attitude towards the usage of Web 2.0. A technology will be more likely to be adopted if a person deem it to be compatible with their intended usage.

Subjective norm. Subjective norm, or social factor, is the social pressure that makes an individual perform or not perform a particular behavior (Ajzen, 1991). Past studies have found that subjective norm is one of the important factors in predicting user's intention to adopt the use of technology in teaching and learning (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Cullen & Green, 2011; Guo & Stevens, 2011; Taylor & Todd, 1995; Park et al., 2012; Teo et al, 2007).

The study by Park et al. (2012) explored the use of mobile learning courses among higher education students in Seoul, Korea. From the study, it was reported that subjective norm was found to be an extrinsic motivational factors, and it influenced the behavioural intention towards the use of mobile learning among the students (Park et al., 2012). Similar findings were found by several other studies where subjective norm was found to be a significant determinant of behavioural intention (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Taylor & Todd, 1995; Teo et al, 2007).

In addition, Ajjan and Hartshorne (2008) found that superior influence and peer influence positively affects subjective norms. This was further proven from the findings by Guo and Stevens (2011) whereby the superior's attitude and behaviour is very influential, especially in the early use of the tool and it influences how they perceive the technology that is being adopted. Guo and Stevens (2011) also further added that course instructors must be aware that the attitudes they bring into the classroom about the technology that is going to be used can have a significant ipact on

the students' uptake and perceptions of that certain technology. This signified that user's behaviour was highly affected by their important referents. The referent groups can be people who are superior to them or their peers. Each of these referents may have different opinions and views in regard to technology usage and adoption.

However, the study by Cullen and Green (2011) found that subjective norm did not make any contribution on whether student teachers would adopt the use of technology in their teaching and learning process. This showed that some individuals may not be as concerned by what others think about their actions and their behaviour will not be affected by it.

Perceived behavioural control. Perceived behavioural control is closely related to the individual's perception of control over carrying out a behaviour (Ajjan & Hartshorne, 2008). According to Ajzen (1991), the importance of actual behavioural control is self-evident, where the perception of behavioural control has greater psychological control interest and impact on intentions and actions as compared to actual control. Several past studies have found that perceived behavioural control towards the use of technology is one of the important factors in predicting user's intention to adopt the use of new technology for teaching and learning purposes (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Sadaf, 2013).

Cheon et al. (2012) explored the use of technology for teaching and learning among undergraduates in the Southwest, United States and findings found that perceived behavioural control was a key determinant in students' intention to adopt technology in their learning. This was consistent with previous studies, where it was also found that perceived behavioural control to be a significant determinant of user behavioural intention (Ajjan & Hartshorne; Sadaf, 2013).

Findings by Buchanan et al. (2013) suggested that self-efficacy is positively associated with the use of learning technology. Individuals who have high technology self-efficacy were reported to use more learning technologies that those who have lower technology self-efficacy (Buchanan et al., 2013). The result was further supported by other findings (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Sadaf, 2013) which indicates that individual's self-efficacy is positively associated with intention to use technology. Therefore, empowering students with confidence in using technology would lead to a greater likelihood of technology adoption (Cheon et al., 2012).

Ajjan and Hartshorne (2008) also suggested that facilitating conditions, such as resources and technology explains a significant variance in perceived behavioural control. Lack of adequate resources, such as insufficient equipment can constraint any technology integration effort and meaningful integration will be difficult, if not impossible, to achieve (Ertmer, 1999). This claim was further supported by Buchanan et al. (2013) where it was found that inhibiting facilitating conditions were associated with lower reported usage of technology.

As educators embraced the availability of technology integration into the classroom, it is important for them to be aware of various technology issues that may arise from its use. One of the most important technology issues that educators need to find out prior to integrating the technology into the classroom is the digital divide or technology gap (Smaldino et al., 2012). This is because, the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage (Taylor & Todd, 1995). However, Taylor and Todd (1995) stated that the presence of facilitating resources may not, per se, encourage the use of technology.

Various Theories Related to Attitude, Belief, and Behavioural Response

Many researches has been conducted in the past concerning attitude, belief, and behavioural response, resulting in the formation of various theoretical models. These theoretical models can be used as a guide to understand attitude, beliefs, and behavioural responses towards technology usage behavior as well as user acceptance towards it. Some examples of the prominent theories available and the most widely used around are the Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), and Technology Acceptance Model (TAM). These theories can be applied across various settings to understand why people accept or do not accept the use of technology.

The Theory of Reasoned Action (TRA). The Theory of Reasoned Action (TRA) was introduced by Fishbein and Ajzen (1975) and is widely used in the social psychology field to predict human behavioural intention or behaviour. Consequently, the theoretical model has the ability to predict as well as to understand the motivational influences on consumer's behaviour, especially in the field of computer technology (Madden, Ellen & Ajzen, 1992).

In addition, the Theory of Reasoned Action (TRA) model appears to be able to provide a relatively simple basis for identifying where and how to target technology consumers' behavioural change attempts (Sheppard, Hartwick & Warsaw, 1988). Figure 2.1 below illustrates the path model for Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975).

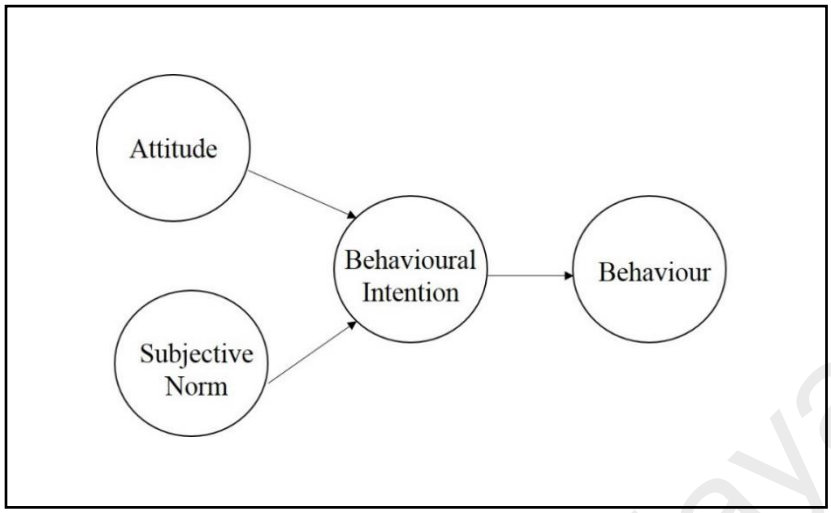

Figure 2.1. The Theory of Reasoned Action (TRA). Adapted from "A Comparison of the Theory of Planned Behavior and the Theory of Reasoned Action," by T. J. Madden, P. S. Ellen and I. Ajzen, 1992, *Personality and Social Psychology Bulletin*, *18*(1), p. 4. Copyright 1992 by the Society for Personality and Social Psychology, Inc.

The Theory of Reasoned Action (TRA) posits that behavioural intention, which is the immediate antecedent to behaviour, is a function of salient beliefs about the likelihood that performing a particular behaviour will lead to a specific outcome (Madden et al., 1992). Moreover, the Theory of Reasoned Action (TRA) is concerned with the determinants of consciously intented behaviours (Davis et al., 1989). In short, the basis of this model is that a person's behaviour is widely determined by his or her behavioural intention.

Behavioural intention is the extent in which a person intended to perform a certain behaviour. According to Ajzen (1988), based on the stand of the Theory of Reasoned Action (TRA), if the behaviour is not completely under the person's control, for instance, if its execution is dependent on other people or if the person lacks of the appropriate skills to perform the behaviour, then it is assumed that the strength of the

relationship between behavioural intentions and the actual behaviour will be attenuated (as cited in Terry & O'Leary, 1995, p. 200).

According to the Theory of Reasoned Action (TRA), there are two factors that jointly determine a person's behavioural intention. The two factors are behavioural beliefs and normative beliefs. The first component, which is the behavioural beliefs, concerns about a person's attitude towards performing a specific behaviour, and it is also proposed to be a function of the salient behavioural beliefs about the perceived consequences of performing the behaviour and the person's evaluation of these consequences (Vallerand, Deshaies, Cuerrier, Pelletier & Mongeau, 1992). The second component, which is the normative beliefs or subjective norms, concerns about a person's perceptions of what important specific referent individuals or groups think he or she should do, and the motivation to comply with these referents (Vallerand et al., 1992).

According to Davis et al. (1989), the Theory of Reasoned Action (TRA) is a general model, and it does not specify the beliefs that are operative for a particular behaviour. Therefore when applying this model to any study, it is important to first identify the beliefs that are significant or salient for subjects regarding the behaviour under investigation.

The Theory of Reasoned Action (TRA) has its own limitation concerning the distinction between a goal intention and a behavioural intention. The model was developed to only deal with behaviours, and not outcomes or events that resulted from the behaviours (Sheppard et al., 1988). This means that the model only fits well within the constraints that they define, such as within conditions in which the target behaviour is not completely under the subjects' voluntary will or control.

The Theory of Planned Behaviour (TPB). The Theory of Planned Behaviour (TPB) was developed by Ajzen (1985) and is an extension of the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975). This theory addresses the limitations in the Theory of Reasoned Action (TRA) model. The Theory of Planned Behaviour (TPB) was made necessary by the original model's limitations in dealing with people's behaviours over which they have incomplete volitional control (Ajzen, 1991). This theory extends the boundary condition of pure volitional control which is specified in the Theory of Reasoned Action (TRA) (Madden et al., 1992).

The central factor in the Theory of Planned Behaviour (TPB) is the same as the Theory of Reasoned Action (TRA), which is the individual's intention to perform a given behavior, in which they are assumed to capture the motivational factors that influence a behaviour (Ajzen, 1991). According to the Theory of Planned Behaviour (TPB), human behaviour is guided by three factors, which are attitude towards the behaviour, subjective norm, and perceived behavioural control. Each of these three factors is in turn determined by underlying belief structures. Beliefs about the likely outcomes of the behaviour and the evaluations of these outcomes are called behavioural beliefs, while beliefs about the normative expectations of others and the motivation to comply with these expecations are called normative beliefs (Ajzen, 1985).

On the other hand, beliefs about the presence of factors that may facilitate or impede performance of the behaviour and the perceived power of these factors are called control beliefs (Ajzen, 1985). According to Mathieson (1991), control beliefs can be situational, for example having access to a terminal, as well as personal, for example being able to use a system.

In combination, attitude towards the behaviour, subjective norm, and perceived behavioural control together forms behavioural intention. In this theory, intention is assumed to be the immediate antecedent of human behaviour (Ajzen, 1985). On the other hand, the direct path from perceived behavioural control to behaviour is assumed to reflect the actual control an individual has over performing the behaviour (Madden et al., 1992). Figure 2.2 below represents the path diagram for Theory of Planned Behaviour (TPB) by Ajzen (1985).

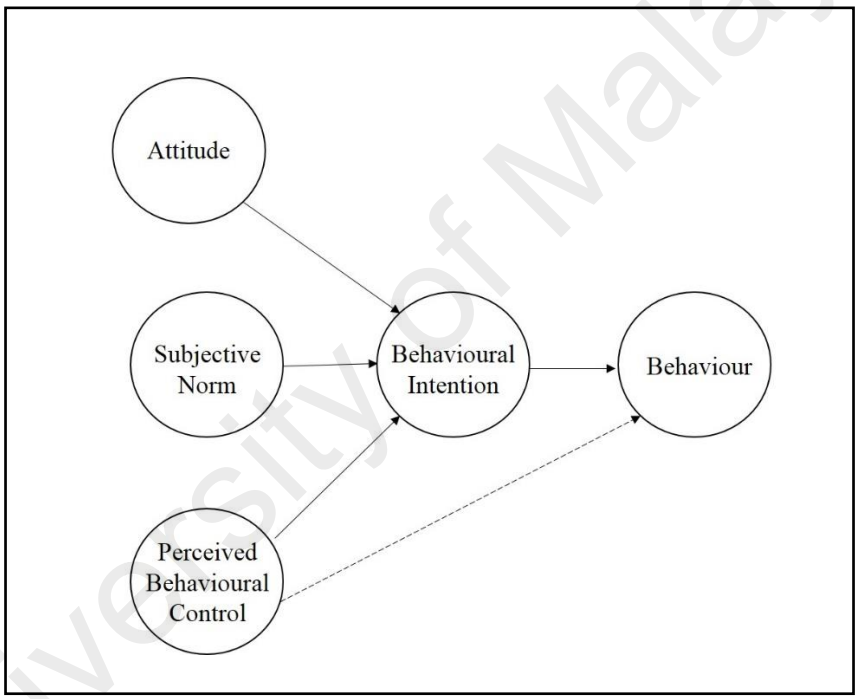

Figure 2.2. The Theory of Planned Behaviour (TPB). Adapted from "The Theory of Planned Behavior," by I. Ajzen, 1991, *Organizational Behavior and Human Decision Processes, 50*(2), p. 182. Copyright 1991 by Academic Press, Inc.

The Theory of Planned Behaviour (TPB) has the ability to explain, on average, more variation in behavioural intention compared to the Theory of Reasoned Action (TRA) regardless of the level of control (Madden et al., 1992). However, Taylor and

Todd (1995) argued that the relationship between the belief structures and the determinants of intention, which are attitude, subjective norm, and perceived behavioural control are not particularly well understood.

The limitations may be due to two factors, where firstly, the belief structures are combined into unidimensional constructs and this may not be consistently related to attitude, subjective norm, or perceived behavioural control (Taylor & Todd, 1995). The second factor is related to the belief sets, especially those relating to attitude, are distinctive to the empirical setting, which makes it difficult to operationalize the theory (Taylor & Todd, 1995). Due to these limitations, Taylor and Todd (1995) proposed a model, which is the Decomposed Theory of Planned Behaviour (DTPB), integrating the Technology Acceptance Model (TAM) and the Theory of Planned Behaviour (TPB) to address the issues related to each models.

The Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) was introduced by Davis (1989) and is useful for understanding user acceptance or rejection of computer-based technology. Accoring to Davis (1989), user acceptance is a pivotal factor in determining the success or failure of an information system project. The Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action (TRA) which was introduced by Fishbein and Ajzen (1975). The Technology Acceptance Model (TAM) is specifically designed to explain computer usage behaviour and is considerably less general compared to the Theory of Reasoned Action (TRA) (Davis et al., 1989).

According to Davis, Bagozzi and Warshaw (1989), "the goal of Technology Acceptance Model (TAM) is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a

broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (p. 985). In short, the aim of this model is not only to predict, but also to explain and justify the reason behind the acceptance or rejection of the technology. Figure 2.3 below illustrates the path model for the Technology Acceptance Model (TAM).

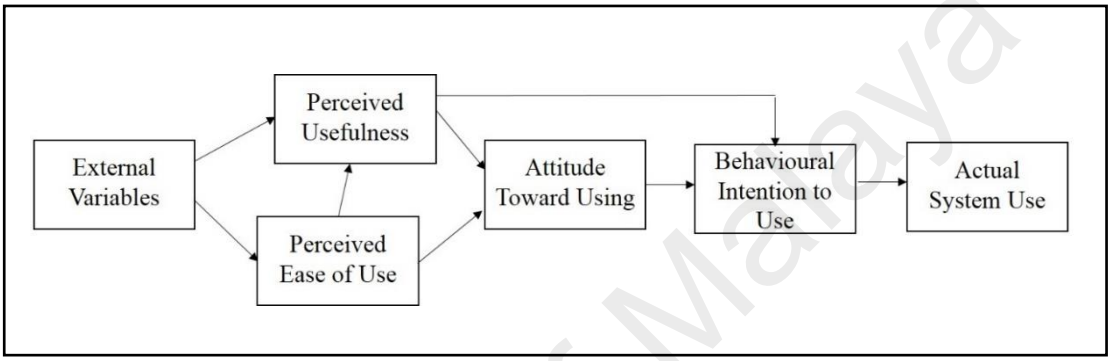

Figure 2.3. The Technology Acceptance Model (TAM). Adapted from "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," by F. D. Davis, R. P. Bagozzi and P. R. Warshaw, 1989, *Management Science*, *35*(8), p. 985. Copyright 1989 by The Institute of Management Sciences.

The Technology Acceptance Model (TAM) posits that two particular beliefs, which are perceived usefulness and perceived ease of use are the primary relevance in determining computer acceptance behaviours among users (Davis et al., 1989). Perceived usefulness can be defined as the extent in which user's perception on the ability of the technology system in increasing his or her performance. On the other hand, perceived ease of use can be defined as the extent of user's perception that using the technology system is free of effort, or effortless to use.

This model theorizes that the effects of external variables, such as system characteristics, development process, or training process, on intention to use are mediated by perceived usefulness and perceived ease of use (Venkatesh & Davis, 2000). Unlike the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM) does not include the variable subjective norm as a determinant of behavioural intention. This is because, as acknowledged by Fishbein and Ajzen (1975), subjective norm is one of the least understood aspects of the Theory of Reasoned Action (TRA) (as cited in Davis et al., 1989).

In the Technology Acceptance Model (TAM), usage behaviour, or actual system use is as a direct function of behavioural intention. On the other hand, behavioural intention is a direct function of attitude. Attitude can be defined as user's favourableness towards using a certain technology. In addition, attitude is jointly determined by perceived usefulness and perceived ease of use. Perceived ease of use is also in turn, a direct determinant of perceived usefulness. This is because, in the Technology Acceptance Model (TAM), perceived usefulness is also influenced by perceived ease of use due to the reason, when other things being equal, the easier the system is to use, the more useful it can be (Venkatesh & Davis, 2000).

According to Davis et al. (1989), "the attitude and behavioural intention relationship which is represented in the Technology Acceptance Model (TAM) implies that, all else being equal, user form intentions to perform behaviours toward which they have positive effect" (p. 986). The Technology Acceptance Model (TAM) differs from the Theory of Planned Behaviour (TPB) because it do not include any social variables or social norms.

The appeal of Technology Acceptance Model (TAM) is that this model suggests a small number of factors which are specific and easy to understand, and can be manipulated through various system design and implementation, hence should be generalizable across settigns (Taylor & Todd, 1995). However, the Technology Acceptance Model (TAM) exludes the influence of social and personal control factors on behaviour, in which it may contributed to the shortcomings of this model (Taylor & Todd, 1995). These factors are however included in the Theory of Planned Behaviour (TPB) in which it is said to increase the understanding of user behaviour.

Despite the limitations of the Technology Acceptance Model (TAM), numerous empirical studies have found that the model has the ability to consistently explains a substantial proportion of the variance, which is typically about 40%, in usage intentions and behaviour, and this model also compares favourably with other alternative models such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) (Legris, Ingham & Collerette, 2003; Venkatesh & Davis, 2000). In addition, Mathieson (1991) stated that the Technology Acceptance Model (TAM) is much easier to use and has the ability to explain user's attitude towards using an information system much better that the Theory of Planned Behaviour (TPB) and may be the model of choice when this variable is of particular interest.

Theoretical Framework: The Decomposed Theory of Planned Behaviour (DTPB)

This study employed the Decomposed Theory of Planned Behaviour (DTPB) which was introduced by Taylor and Todd (1995) as a theoretical framework to guide this study. The Decomposed Theory of Planned Behaviour (DTPB) explored the direct measures of three factors, which are attitudes, subjective norm, and perceived behavioural control by decomposing them into specific belief-based dimensions which

could provide a deeper understanding of intention and usage behaviour (Taylor & Todd, 1995). The Decomposed Theory of Planned Behaviour (DTPB) was chosen as the theoretical framework for this study because it is explicitly designed to explain user's technology usage by exploring various factors that could influence the extent to which the technology will be used.

The Decomposed Theory of Planned Behaviour (DTPB) originated from the Theory of Planned Behaviour (TPB) by Ajzen (1985), where the belief structures were decomposed into lover level beliefs. Theory of Planned Behaviour (TPB) postulates three conceptually independent determinants of intention, which are attitude towards behaviour, social factor or subjective norm, and perceived behavioural control (Ajzen, 1991). The Theory of Planned Behaviour (TPB) are able to predict and understand people's intentions to engage in various activities (Ajzen, 1991).

Taylor and Todd (1995) conducted a study on business university students and compare The Technology Acceptance Model (TAM) by Davis (1989), the Theory of Planned Behaviour (TPB) by Ajzen (1991), and the Decomposed Theory of Planned Behaviour (DTPB) to assess which model best helps to understand usage of information technology (p.144). Based on the findings, it was found that the Decomposed Theory of Planned Behaviour (DTPB) has the ability to explain 60% of the variance in behavioural intention, while the Technology Acceptance Model (TAM) explains 57% and the Theory of Planned Behaviour (TPB) explains 60% (Taylor & Todd, 1995, p. 166).

The Decomposed Theory of Planned Behaviour (DTPB) was found to have better overall predictive power and are able to provide a fuller understanding of intentions and usage behaviour compared to the other two models. This is due to its complexity as it involves a larger number of factors as compared to the other two

models which could provide a more complete understanding of technology usage. Therefore, the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995) provides a more complete and comprehensive explanation of behavioural intention by accounting the effects of the decomposed beliefs.

In The Decomposed Theory of Planned Behaviour (DTPB) model, attitudinal, normative and control beliefs are decomposed into multidimensional belief constructs (Taylor & Todd, 1995). By focusing on specific beliefs, the model become more managerially relevant, which enable researcher to point at specific factors that may influence technology adoption and usage (Taylor & Todd, 1995). Additionally, the relationships are clearer and easily to be understood. The decomposition of factors in The Decomposed Theory of Planned Behaviour (DTPB) are able to provide a stable set of beliefs which can be applied across a variety of settings, hence the reason it was chosen as a theoretical framework for this study.

Moreover, the factors can be manipulated through systems design and implementation strategies, making it useful to be applied in a variety of situations (Taylor & Todd, 1995). This is because, although the Decomposed Theory of Planned Behaviour (DTPB) shared many of the same advantages associated with the Technology Acceptance Model (TAM), it differs in a way that it is more complex because it introduces a larger number of factors that may influence usage (Taylor & Todd, 1995). Therefore, due to this factor, the Decomposed Theory of Planned Behaviour (DTPB) has the ability to provide a more comprehensive and complete understanding of technology usage compared to the Technology Acceptance Model (TAM).

In the Decomposed Theory of Planned Behaviour (DTPB), behavioural intention is said to be a function of attitude (ATT), subjective norms (SN), and perceived behavioural control (PBC). These three (3) factors, which are attitude (ATT), subjective norms (SN), and perceived behavioural control (PBC) are then further decomposed into lower level belief constructs.

Based on the Decomposed Theory of Planned Behaviour (DTPB), there are three (3) measures that could explain attitude (ATT). The measures are: (1) perceived usefulness (PU); (2) ease of use (EU); and (3) compatibility (COMP). Next, there are two (2) measures that could explain subjective norms (SN). The measures are: (1) peer influence (PI); and (2) superior influence (SI). Finally, there are three (3) beliefs that could explain perceived behavioural control (PBC). The measures are: (1) self-efficacy (SE); (2) resource facilitating condition (RFC); and (3) technology facilitating condition (TFC).

Taylor and Todd (1995) suggested that all three (3) determinants, which are attitude (ATT), subjective norms (SN), and perceived behavioural control (PBC) are significantly related to intention (INT), and consequently determinants of usage behaviour towards technology. Figure 2.4 below shows the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995) which served as the theoretical framework to guide this study.

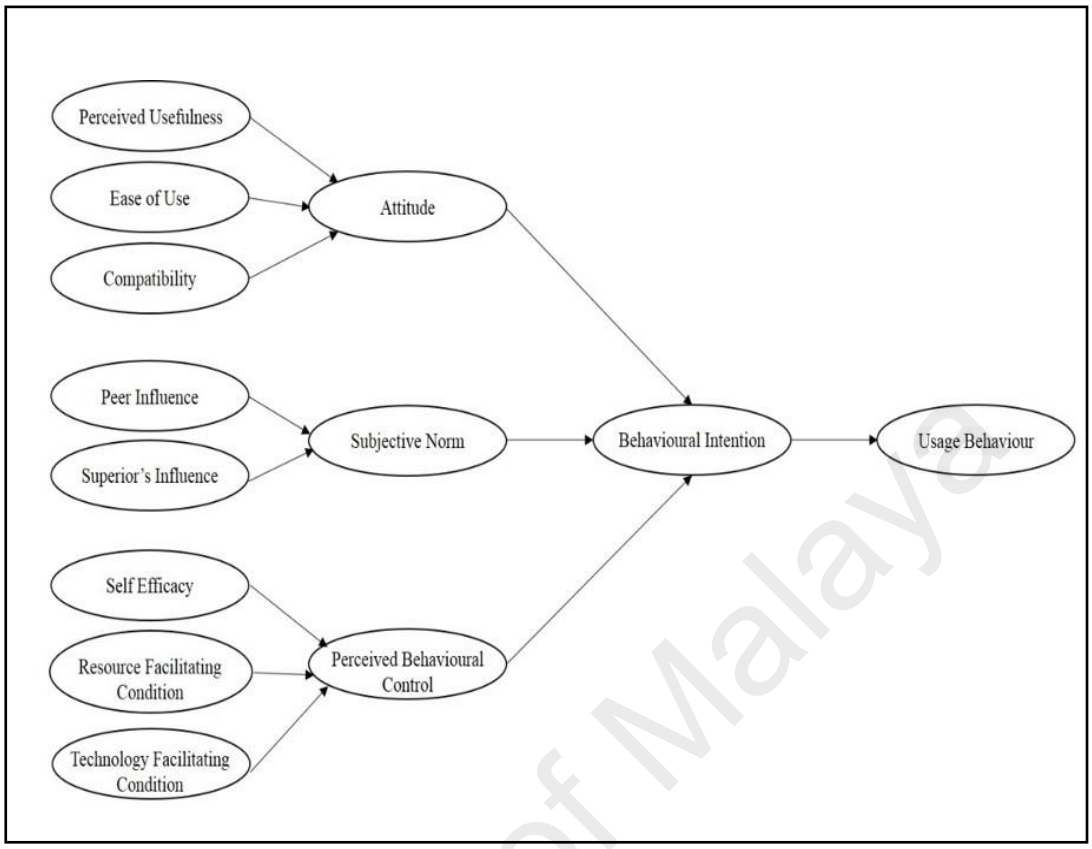

Figure 2.4. The Decomposed Theory of Planned Behaviour (DTPB). Adapted from "Understanding Information Technology Usage: A Test of Competing Models," by S. Taylor and P. A. Todd, 1995, *Information Systems Research*, *6*(2), p. 146. Copyright 1995 by Information Systems Research.

Attitude. Attitude (ATT) can be defined as a person's feelings toward performing a certain behaviour. According to Ajzen (1991), attitude refers to the degree in which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question.

The Decomposed Theory of Planned Behaviour (DTPB) assumes that the basis of attitude lies in the salient belief that certain behaviour lead to certain outcomes (Taylor & Todd, 1995). The construct attitude (ATT) consists of three (3) determinant

variables, which are: (1) perceived usefulness, PU; (2) ease of use, EU; and (3) compatibility, COMP.

Perceived usefulness (PU) can be defined as a person's perception about the usefulness of a technology in helping him or her to perform certain tasks. Taylor and Todd (1995) described perceived usefulness as analogous to the term relative advantage, in which can be defined as the degree to which an innovation provides benefits which overtake those of its precursor and may incorporate factors such as economic benefits, image enhancement, convenience, and satisfaction.

On the other hand, ease of use (EU) can be defined as the level of difficulties that a person perceived he or she needed to undertake in using a particular technology. Finally, the third factor, which is compatibility (COMP) refers to the extent to which that technology fits the task, values, experiences, and needs of the user (Rogers, 2003, as cited in Ajjan & Hartshorne, 2008).

According to Taylor and Todd (1995), "in general, as the perceived relative advantages or perceived usefulness, and compatibility increase, and as complexity or ease of use decreases, attitude towards information systems usage should be more positive" (p. 152).

Subjective norm. Subjective norm, (SN) refers to a person's perception of other people's views either that person should or should not perform a certain behaviour (Ajzen, 1991). Subjective norm (SN) reflects on the perception of whether a certain behaviour is encouraged and accepted within the person's circle of influence (Ajjan & Hartshorne, 2008). In the Decomposed Theory of Planned Behaviour (DTPB), subjective norm (SN) is further decomposed into two (2) relevant referent groups according to student participants, which are: (1) peers; and (2) superiors

(Taylor & Todd, 1995). Peers refer to other students, while superiors are teacher or lecturer, or a person who is superior to the participant.

Each of these referents may have different opinions and views in regard to the use of technology. For example, the course lecturer may encourage students to use the technology, therefore this may give the student a positive view on using the technology for their learning. On the other hand, peers may not think that the use of technology for learning would be beneficial for the students, therefore this may affect a students' view on the importance of using technology for their learning.

Perceived behavioural control. Perceived behavioural control (PBC) can be defined as people's perceptions of their own ability to perform a certain behaviour based on the presence or absence of requisite resources and opportunities (Ajzen, 1991). Meanwhile, Taylor and Todd (1995) stated that perceived behavioural control (PBC) "reflects an individual's belief regarding access to resources and opportunities needed to perform a behavior, or alternatively, to the internal and external factors that may impede performance of the behavior" (p. 150).

Ajzen (1991) stated that the importance of actual behavioural control, which is the resources and opportunities available to a person, is self-evident in which to some extent dictate the likelihood of behavioural intention. However, perceived behavioural control involves an individual's perception of behavioural control, in which it is of greater psychological interest than actual control, which could impact intentions (Ajzen, 1991).

In addition, Ajzen (1991) also stated that the more resources and opportunities individuals believe they possess, and the fewer obstacles or impediments they anticipate, the greater should be their perceived control over the behaviour. According to the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), there are three (3) measures that determines perceived behavioural control (PBC). The three (3) measures are: (1) self-efficacy (SE); (2) technology facilitating condition (TFC); and (3) resource facilitating condition (RFC).

Self-efficacy (SE) refers to a person's confidence in regards to his or her ability to perform a certain behaviour successfully. Self-efficacy (SE) is often related to a person's own perceived ability, and the higher level of self-efficacy was found to lead to a higher level of behavioural intention (Taylor & Todd, 1995).

Technology facilitating condition (TFC) on the other hand refers to the availability of technological facilities that are needed by a person to successfully perform a certain task or behaviour. Some examples of technology facilitating conditions (TFC) are computers and the Internet.

On the other hand, resource facilitating conditions (RFC) refers to the availability of resources that are needed by a person to perform a certain task or behavior. Some examples of resource facilitating condition (RFC) are time, money, and also suitable environment. According to Taylor and Todd (1995), "the absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage" (p. 153). However, Taylor and Todd (1995) added that presence of facilitating resource may not, per se, encourage usage.

Behavioural intention. Behavioural intention (INT) can be defined as the level of individual's willingness or the effort they are planning to exert to perform a certain behaviour (Ajzen, 1991). Ajzen (1991) suggested that the stronger the intention to engage in a particular behaviour, the more likely should be its performance. According to Taylor and Todd (1995), behavioural intention is the most important determinant of information technology usage and the Decomposed Theory of Planned Behaviour (DTPB) has the ability to provide a more complete understanding of behavioural intention.

According to the Decomposed Theory of Planned Behaviour (DTPB), behavioural intention (INT) is influenced by three (3) measures. The measures are: (1) attitude (ATT), (2) subjective norm (SN), and (3) perceived behavioural control (PBC).

Conceptual Framework

The conceptual framework that guided this study was adapted from The Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995). Figure 2.5 below shows the conceptual framework that is used to guide this study.

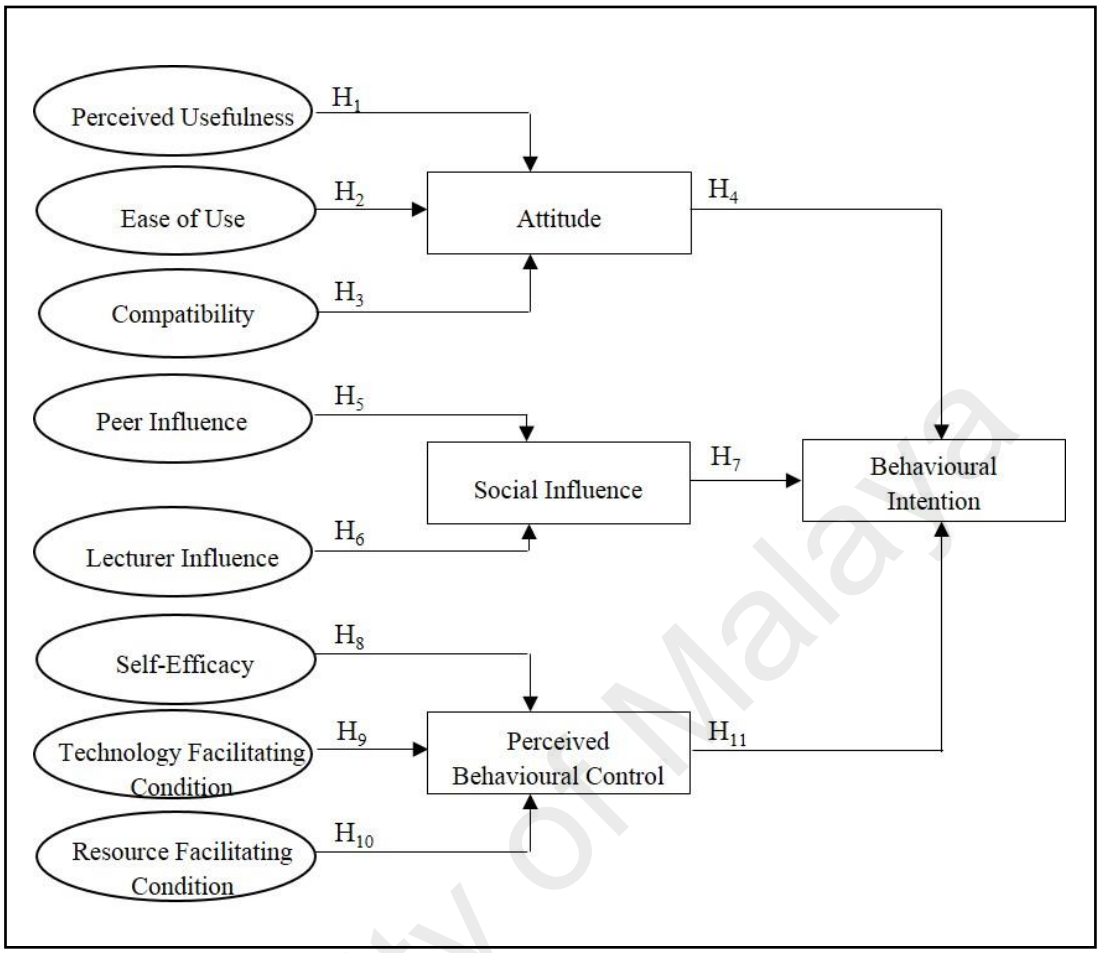

Figure 2.5. Conceptual framework for factors influencing students' intention to utilize Wiki based on the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995)

Perceived usefulness (PU). Perceived usefulness (PU) refers to an individual's perception about the usefulness or practicality of a technology in helping him or her to perform his or her tasks successfully. In this study, perceived usefulness (PU) denotes how useful and helpful students feel that using a web-based collaborative tool, which is Wiki, could help them perform better in their learning process.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), perceived usefulness (PU) is one of the determinants of attitude *(ATT)* towards behavioural intention (INT). If a student feel that using Wiki will be useful in helping her to progress well in her learning, there is a higher probability that the student will have a positive attitude towards it. On the other hand, if a student feel that using Wiki is not useful in helping her to progress well in her learning, there will be a lower probability that the student will have a positive attitude towards it.

This is because, in general, as perceived usefulness (PU), compatibility (COMP), and ease of use (EU) increase, attitude (ATT) towards the use of Wiki should be more positive. Therefore, it is expected that as students' perceived usefulness (PU) towards Wiki is positive, their attitude (ATT) towards the use of Wiki will also be positive. Hence, the first research hypothesis for this study can be inferred as follows:

H_1 : There is a positive relationship between perceived usefulness and students' attitude when using Wiki.

Ease of use (EU). Ease of use (EU) can be defined as the level of difficulties that a person perceived he or she needed to undertake in using a particular technology. In this study, ease of use (EU) is the extent to which students think that using Wiki is easy and effortless to use.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), ease of use (EU) is one of the determinants of attitude towards behavioural intention (Taylor & Todd, 1995). If a student feel that Wiki is easy and effortless to use, there is a higher probability that the student will have a positive attitude towards it. On the other hand, if a student feel that Wiki is difficult and requires

a high level of skills to use, there is a lower probability that the student will have a positive attitude towards it.

This is because, in general, as ease of use (EU), perceived usefulness (PU), and compatibility (COMP) increase, attitude (ATT) towards the use of Wiki should be more positive. Therefore, it is expected that as students' perceived ease of use towards Wiki is positive, their attitude towards the use of Wiki will also be positive. Hence, the second research hypothesis for this study can be inferred as follows:

H_2 : There is a positive relationship between ease of use and students' attitude when using Wiki.

Compatibility (COMP). Compatibility (COMP) can be defined as the extent in which that a particular technology fits the task, values, experiences, and needs of the user (Rogers, 2003, as cited in Rogers et al., 2005). In this study, compatibility (COMP) refers to the degree in which students think that using Wiki fits their learning activities and needs.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), compatibility (COMP) is one of the beliefs that measure attitude (ATT). If a student think that using Wiki is compatible with his or her learning needs and values, there is a higher probability that he or she will have a positive attitude towards it. On the other hand, if a student think that using Wiki is not compatible with his or her learning needs and values, there is a lower probability that he or she will have a positive attitude towards it.

This is because, in general, as compatibility (COMP), perceived usefulness (PU), and ease of use (EU) increase, attitude (ATT) towards the use of Wiki should be more positive. Therefore, it is expected that as students' perceived compatibility

(COMP) towards Wiki is positive, their attitude (ATT) towards the use of Wiki will also be positive. Hence, the third research hypothesis for this study can be inferred as follows:

H_3 : There is a positive relationship between compatibility and students' attitude when using Wiki.

Attitude (ATT). Attitude (ATT) can be defined as a person's feelings toward performing a certain behaviour (Taylor & Todd, 1995). In this study, attitude (ATT) refers to students' feelings or attitude about the use of Wiki for teaching and learning purposes, and whether it is positive or negative. Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), attitude (ATT) is one of the determinants of behavioural intention (INT).

Attitude (ATT) is measured by three (3) factors, which are: (1) perceived usefulness (PU); (2) ease of use (EU); and (3) compatibility (COMP). Attitude (ATT) is equated with the attitudinal belief that performing a certain behaviour will lead to a particulatar outcome, weighted by an evaluation of the desirability of that outcome (Taylor & Todd, 1995).

For example, a student may feel that using technology will result in a better learning performance and may consider this as a highly desirable outcome. This demonstrates a positive attitude by the student. On the other hand, a student may feel that the using technology do not result in a better learning performance and may consider this as an undesirable outcome. This in turn, demonstrates a negative attitude by the student.

In general, as perceived usefulness (PU), compatibility (COMP), and ease of use (EU) increase, attitude (ATT) towards the use of Wiki should be more positive. Therefore, it is expected that students' positive attitude towards the use of Wiki for their learning to positively influences their intention to use it. Hence, the fourth research hypothesis for this study can be inferred as follows:

H_4 : There is a positive relationship between attitude and behavioural intention towards the use of Wiki.

Peer influence (PI). Peer influence (PI) can be defined as the social pressure faced by individuals, particularly from peers which are closely related to them. Peer influence (PI) could influence a person's behaviour or thinking. In the context of this study, peer influence (PI) is the effect of a student's course mates towards their positivity or inclination in using Wiki for learning.

Based on the Decomposed Theory of Planned Behaviour (DTPB), peer influence (PI) is one of the determinants of social attitude (ATT) towards behavioural intention (INT). If a student believes that his or her course mates think that he or she should use Wiki for learning, there is a higher probability that the student will have a positive social influence towards it. On the other hand, if a student believes that his or her course mates think that he or she should not use Wiki for learning, there is a lower probability that the student will have a positive social influence towards it.

This is because, in general, if peer influence (PI) and lecturer influence (LI) are positive, this may result in positive social influence (SI) towards the use of Wiki. Therefore, it is expected that positive peer influence towards the use of Wiki for students' learning positively affect their social influence. Hence, the fifth research hypothesis for this study can be inferred as follows:

H_5 : There is a positive relationship between peer influence and social influence when using Wiki.

Lecturer influence (LI). Lecturer influence (LI) can be defined as how strong the effect of a superior or lecturer can have towards students. In this study, lecturer influence (LI) is how the course lecturer may have an impact on students' intention to adopt the use of Wiki in their learning.

Based on the Decomposed Theory of Planned Behaviour (DTPB), lecturer influence (LI) is one of the determinants of social influence (SI) towards behavioural intention (INT). The lecturer may encourage the use of Wiki for the course, thinking that it would benefit the students' learning progress. Therefore, there is a higher probability that the student will have a positive social influence towards it. However, if the lecturer is not too encouraging on the use of Wiki for the course, there is a lower probability that the student will have a positive social influence towards it.

This is because, in general, if lecturer influence (LI) and peer influence (PI) are positive, this may result in positive social influence (SI) towards the use of Wiki. Therefore, it is expected that positive lecturer influence towards the use of Wiki for students' learning positively affect their social influence. Hence, the sixth research hypothesis for this study can be inferred as follows:

H_6 : There is a positive relationship between lecturer influence and social influence when using Wiki.

S**ocial influence (SI).** Social influence (SI) can be briefly described as how an individual's behaviour is influenced by other people's views. In this study, social influence (SI) can be seen as how people who are influential and important to the students think that a particular behaviour should or should not be executed.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), social influence (SI) is one of the determinants of behavioural intention (INT). Social influence (SI) is further decomposed into two (2) groups according to their circle, which are: (1) lecturer influence (LI); and (2) peer influence (PI).

A student may believe that his or her peers think that he or she should use Wiki for learning and may consider this as a highly desirable outcome. Therefore, it is expected that positive social influence towards the use of Wiki for the student's learning positively influences his or her intention to use it. On the other hand, a student may believe that his or her peers do not think that he or she should use Wiki for learning and may not consider this as a highly desirable outcome. Therefore, it is expected that social influence towards the use of Wiki for the student's learning do not positively influences his or her intention to use it. Hence, the seventh research hypothesis for this study can be inferred as follows:

H_7 : There is a positive relationship between social influence and behavioural intention towards the use of Wiki.

Self-efficacy (SE). Self-efficacy (SE) can be briefly described as one's belief in his or her own capability to execute or carry out a certain task successfully (Bandura, 1994). This belief determines how people feel, think and behave. A high level of self-efficacy indicates that a person is confident of this or her own ability in doing a certain task successfully, therefore he or she would have a higher probability of attempting to execute the task. On the other hand, a low level of self-efficacy indicates that a person is not confident of his or her own ability in doing a certain task successfully, therefore he or she would have a lower probability of attempting to execute the task. In this study, self-efficacy (SE) refers to a student's belief in their own ability in using Wiki for learning purposes.

Based on the Decomposed Theory of Planned Behaviour (DTPB), self-efficacy (SE) is one of the determinants of perceived behavioural control (PBC) towards usage intention (INT). If a student feels that he or she is confident with his or her own ability to use Wiki, there is a higher possibility that he or she will adopt the use of Wiki for the learning process. Therefore, there is a higher probability that the student will have a positive perceived behavioural control (PBC) towards it. On the other hand, if a student feels that he or she is not confident with his or her own ability to use Wiki, there is a lower possibility that he or she will adopt the use of Wiki for the learning process. Therefore, there is a lower probability that the student will have a positive perceived behavioural control (PBC) towards it.

This is because, in general, if self-efficacy (SE), technology facilitating condition (TFC), and resource facilitating condition (RFC) are positive, this may result in positive perceived behavioral control (PBC) towards the use of Wiki. Therefore, it is anticipated that higher level of self-efficacy (SE) in regards of Wiki usage positively

affect their perceived behavioural control (PBC). Hence, the eighth research hypothesis for this study can be inferred as follows:

H_8 : There is a positive relationship between self-efficacy and perceived behavioural control when using Wiki.

Technology facilitating condition (TFC). Technology facilitating condition (TFC) can be briefly described as the availability of technological facilities needed for a person to successfully perform a certain task or behaviour. According to Taylor and Todd (1995), the absence of facilitating resources could represent barrier to usage and may inhibit the formation of intention and usage. In the context of this study, technology facilitating condition (TFC) refers to the availability of needed technology to run Wiki successfully for learning to happen. Examples of technology facilitating conditions (TFC) are compatible computers and Internet access.

In the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), technology facilitating condition (TFC) is one of the determinants of perceived behavioural control (PBC) towards behavioural intention (INT). If a student feels that he or she does not have sufficient technological facilities to use Wiki for his or her learning, it may inhibit her effort to use Wiki. On the other hand, if a student feels that he or she have sufficient technological facilities to use Wiki for his or her learning, it will increase their effort to use Wiki.

Therefore, it is expected that the availability of technology facilitating condition (TFC) positively affect perceived behavioural control (PBC). Hence, the ninth research hypothesis for this study can be inferred as follows:

H_9 : There is a positive relationship between technology facilitating condition and perceived behavioural control when using Wiki.

Resource facilitating condition (RFC). Resource facilitating condition (RFC) can be defined as the availability of resources needed to for an individual to perform a certain task or behaviour successfully. Examples of resource facilitating conditions (RFC) are time, money, or environment. In the context of this study, resource facilitating condition (RFC) refers to the availability of needed resources for students to use Wiki successfully for their course. Examples of resource facilitating conditions (RFC) in this study are classroom environment that is fully-equipped with computers and Internet connection for the students to run Wiki successfully for course purposes.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), resource facilitating condition (RFC) is one of the determinants of perceived behavioural control (PBC) towards usage intention (INT). If a student feels that he or she does not have sufficient resource facilities to use Wiki successfully for learning, it may inhibit his or her effort to use Wiki. On the other hand, if a student feels that he or she have the sufficient resource facilities to use Wiki successfully for learning, it may increase his or her effort to use Wiki.

Therefore, it is expected that the availability of resource facilitating condition (RFC) positively affect perceived behavioural control (PBC). Hence, the tenth research hypothesis for this study can be inferred as follows:

H_{10} : There is a positive relationship between resource facilitating condition and perceived behavioural control when using Wiki.

Perceived behavioural control (PBC). Perceived behavioural control (PBC) can be defined as the individual's belief in regards to access to resources and opportunities needed for him or her to perform a particular behaviour which may inhibit or facilitate the behaviour (Taylor & Todd, 1995). Perceived behavioural control (PBC) also represents a person's perceptions of the internal and external constraints that they face in performing a certain behaviour. In the context of this study, perceived behavioural control (PBC) is reflected by student's belief in regards to the availability of resources and opportunity for him or her to use Wiki successfully for learning.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), perceived behavioural control (PBC) is one of the determinants of behavioural intention (INT). Perceived behavioural control (PBC) is measured by three (3) factors, which are: (1) self-efficacy (SE); (2) technology facilitating condition (TFC); and (3) resource facilitating condition (RFC).

Therefore, it is expected that positive perceived behavioural control (PBC) in relation to Wiki usage positively influences students' intention (INT) to use it. Hence, the eleventh research hypothesis for this study can be inferred as follows:

H_{11} : There is a positive relationship between perceived behavioural control and behavioural intention towards the use of Wiki.

Behavioural intention (INT). Behavioural intention (INT) can be briefly described as the level of willingness or effort a person is planning to exert to perform a certain behaviour (Ajzen, 1991). Ajzen (1991) suggested that behavioural intention (INT) is the most important determinant in predicting actual usage behaviour. In the context of this study, behavioural intention (INT) refers to students' intention to use Wiki for teaching and learning purposes, in which it may be influenced by several motivational factors.

Based on the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995), behavioural intention (INT) is influenced by three (3) measures, which are: (1) attitude (ATT); (2) subjective norm or social influence (SI); and (3) perceived behavioural control (PBC). Ajzen (1991) suggested that behavioural intention (INT) is the weighted sum of attitude (ATT), subjective norm or social influence (SI) and perceived behavioural control (PBC) components, where each of the determinants are determined by their own underlying belief structures.

When formulating the conceptual framework using the Decomposed Theory of Planned Behaviour (DTPB), behavioural intention was used as a final dependent variable instead of actual behaviour. This is because, according to Ajzen (1991), intentions are assumed to capture the motivational factors that influence a behaviour, in which they are the indications of how hard individuals are willing to try, and how much effort they are planning to exert in order to perform the behaviour (p. 181). As a general rule, the stronger the intention to engage in a behaviour, the more likely should be its performance (Ajzen, 1991, p. 181).

Summary of Chapter

The literature review chapter discussed and reviewed the related literatures concerning the use of web-based collaboration tool, specifically for teaching and learning purposes. Additionally, the learning theory behind the implementation of learning and instruction of web-based collaboration tool in the classroom were also presented. Several past studies that have been conducted in regards to the implementation of a specific web-based collaboration tool, which is Wiki, for collaborative learning in education context were discussed in this section. The educational level ranging from primary, secondary, and tertiary level were explored.

The research studies also focused on how Wiki was used in the classroom and discuss factors that influence the use of this tool for learning and collaboration purposes. This literature review section presented several recent studies that address the issues regarding the use of a web-based collaboration tool, namely Wiki in higher education context. This was to gain a greater understanding and provide a knowledge base to this study.

In subsequent chapter, which is Chapter 3, the research methodology that are used in this study were discussed. The methodology includes research design, sampling method, data collection method, and also research analysis techniques.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The aim of this study was to explore the use of Wiki for collaborative learning purposes among students in higher education context. This study intended to examine students' perception towards the pedagogical benefits of Wiki for collaborative learning in five (5) terms, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

In addition, this study also aimed to examine the factors that are related to students' intention to use Wiki for teaching and learning purposes. The relationships between the three factors, which are attitude, social influence, and perceived behavioural control, with behavioural intention towards the use of Wiki were examined. Finally, the purpose of this study was also to find out the factors that best predict students' intention to use Wiki in the future.

This chapter described in detail about the research methodology that were used in this study, namely the research approach, research design, participants, sampling method, data sources, data collection procedures and also the data analysis methods that were employed in order to answer the research questions.

Research Approach and Design

This study incorporated parallel mixed-methods research approach, which involved the process of simultaneous collections of both quantitative and qualitative data. The analysis of both datasets were done separately and compared, while making

an interpretation as to whether the result support or contradict each other (Creswell, 2008).

This type of research design enables researcher to combine the strength of both types of data collection, where quantitative data provide for generalizability, whereas qualitative data offer information about the context or setting (Creswell, 2008). This enables researcher to gain a better understanding of the research conducted.

The research design for the quantitative part of this study was cross-sectional survey design. In cross-sectional survey design, the main purpose is to describe people's attitudes, opinions, behaviours or characteristics that describe the population in general (Creswell, 2008). For instance, cross-sectional survey design can be used to obtain opinions on students' perceptions towards the use of Wiki for collaborative learning purposes.

The second unique characteristic of this type of survey design is, data are collected at one point in time using survey as the main source of data collection (Creswell, 2008). It means that the researcher are able to gather and measure data from participants about their current views or attitudes on certain issues. Based on these characteristics, cross-sectional survey design is deemed as the most relevant and appropriate to be applied for this study.

First, the aim of this study was to explore students' perception towards the pedagogical benefits of Wiki among the target population, which are undergraduates in a higher education institution who have received exposure to Wiki during their fourteen-week (14) course. Apart from that, the purpose of this study was to investigate the factors that relate to students' intention to use Wiki for teaching and learning purposes. The participants of this study completed a survey at the end of the semester after they have completed the course.

For the qualitative phase of the research design, data were obtained from open-ended survey and focus group interview. Focus group interview session was conducted with the students at the end of the course to gain a better understanding of students' perceptions in regards to the use of Wiki to supplement in-class learning. Focus group interview involves the process of collecting data by interviewing a group of people to gather responses from all individuals in it (Creswell, 2008).

For this study, the researcher conducted a focus group interview session with twenty two (22) students who enrolled in the course implementing the use of Wiki for teaching and learning purposes. The focus group interview data were audio-recorded and the researcher took important notes during the session.

Research Sample and Context

Sampling procedures and samples. The sampling design used in this study was purposeful sampling. In purposeful sampling, the researcher selects participants who fits into a profile with the logic of yielding insight and understanding of the phenomenon under investigation (Bloomberg & Volpe, 2008). In this study, the samples were students from a higher learning institution in Malaysia enrolling in a course which incorporated Wiki as a supplementary tool for teaching and learning.

The number of participants were one hundred and nine (109) full-time undergraduates from different demographic backgrounds. This research intended to study from the view of learners from different demographic backgrounds, such as age, social, and technical backgrounds, thus gaining wider perspectives in regards to the Wiki usage for teaching and learning.

Context of study. The participants of this study enrolled in an undergraduate course called Principles of Instructional Technology. The Principles of Instructional Technology course introduced students to various technology and Web 2.0 tools that are available on the web, including Wiki. Throughout the course, the students do not only learn about Wiki but they also learn with Wiki, where the tool was used to supplement the classroom instruction.

Unlike other studies on Wiki that used Wiki as an online platform to support students' learning outside classrooms (Chong et al., 2011; Elgort et al., 2008; Franco, 2008; Hughes & Narayan, 2009; Li et al., 2010; Li et al., 2012; Miyazoe, 2010; Woo et al., 2011; Zorko, 2009), the students in this course utilized Wiki inside their face-to-face classroom meetings. In this course, students listened to lectures on a topic given by the course instructor and then they will be engaged in collaborative instructional activities which were mainly conducted online via the class Wiki.

PBworks (www.pbworks.com) was used as the Wiki platform to supplement classroom instructions and as a place to conduct learning activities related to the course. Figure 3.1 and Figure 3.2 below displays the screenshot of the front page of the class Wiki. An example of class activities conducted in the class Wiki was, after listening to a lecture on the topic "Classroom management in the 21st century", students were asked by the lecturer to do further research on the topic by searching the Internet, articles, or books. Next, the students will work collaboratively with their peers on an activity using the class Wiki (see Figure 3.3). The activities were either conducted during the classroom hours or given as assignments.

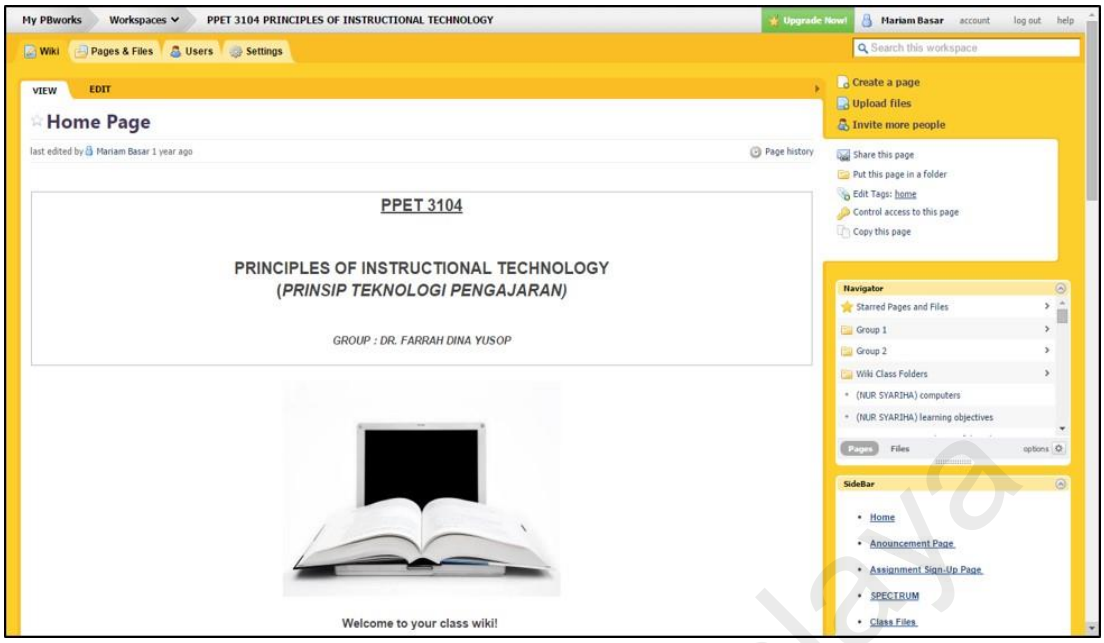

Figure 3.1. A screenshot of the front page of the class Wiki using the PBworks platform

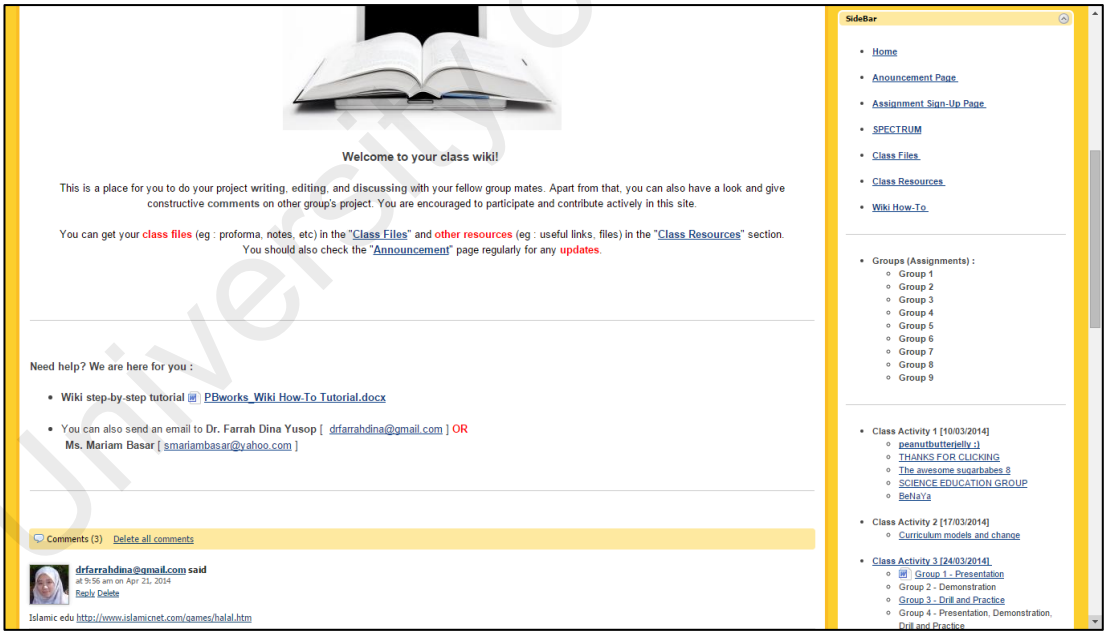

Figure 3.2. A screenshot of the front page of the class Wiki using the PBworks platform

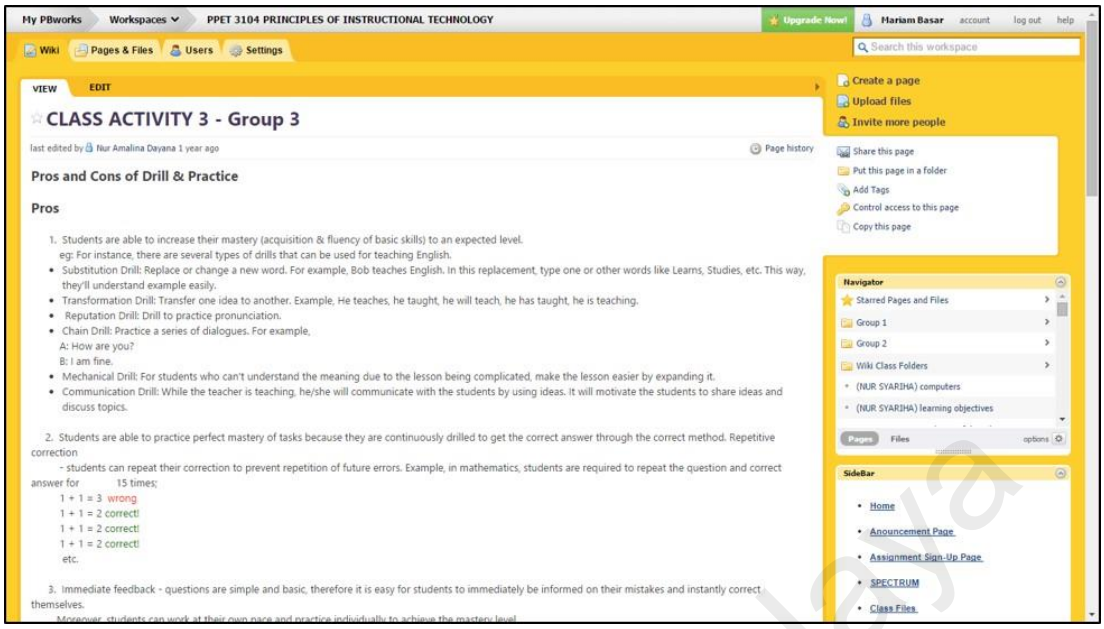

Figure 3.3. Screenshot of the Wiki group activity conducted during the class session using PBworks platform

The Wiki used in this study, which was PBworks, is an open-sourced tool and it is freely available for everyone to use. However, students need to have technological devices such as computer, smartphone, or a tablet which are equipped with an Internet connection in order for them to run Wiki successfully in the web browser.

The course was designed to be workshop-based and student-centred, switching from the traditional lecture-based face-to-face classroom. Additionally, the course assignments and class activities were done collaboratively in small groups of three to four members, where students worked together in the class Wiki, assisted by the course instructor.

The course was held for the duration of fourteen (14) weeks as determined by the faculty. The students in the course were divided into three (3) different groups and were taught by three different instructors, as determined by the faculty. However, all

three groups were using the same course materials, resources, instructional activities and also the Wiki platform.

Hands-on training and tutorials on how to use Wiki were provided during the first week of the course to introduce students to the Wiki platform, which is PBworks. The purpose of the training session was for the students to familiarize themselves with the Wiki platform that will be used throughout the teaching and learning session. It is important for course instructors to take note that students require training in the technologies that they will use in their learning and ideally, such training should happen as early as possible and should be comprehensive (Guo & Stevens, 2011).

During the training session, students were guided step-by-step by the course instructor on how to navigate around the class Wiki. In addition to the training session, a printed copy of the Wiki step-by-step module and guidelines entitled "Wiki How-to: A step-by-step guide for starters to PBworks" was prepared and given to every students at the beginning of the semester (refer Appendix A). The Wiki step-by-step module was created and provided to the students for them to refer to whenever they encountered any issue or problems regarding Wiki. Additionally, students were also given an option to send the course instructor or the Wiki moderator an electronic mail or e-mail whenever they encounter any issues or difficulties when navigating the class Wiki.

Although Wiki is considerably easy to use and does not require users to have advanced technological skills to use it, however, it is important for course instructors to provide trainings and guidelines for students, especially during the early stages of the course. This is a crucial step in order to ensure learners are familiarized with the tools to encourage participation and would not feel left out due to their incompetency in using it. This step also was to ensure that the students are comfortable with Wiki

and do not feel that the tool is difficult to use. Deters, Cuthrell and Stapleton (2010) suggested that the initial discomfort some students may experience with new technology can be alleviated with careful explanations, demonstrations, and examples for the application of Wiki to the class assignment, as well as sufficient time given to the students in order for them to develop competence with the new technology.

Moreover, during the training session, students were also taught on the basic troubleshooting method when using the Wiki platform so that they know what to do whenever they encounter any issue when using it. This is because, when students were taught to use the Wiki feature and what they can do with it, the students are more likely will use it better for their learning purposes (Zorko, 2009). It is also important for course instructors to not assume that students can learn how to use the tool themselves although that they belong into the digital generation group.

The course Wiki was set to private mode, where only invited members of the course were allowed to view and participate in it. During the first week of the course session, students were asked to provide their e-mail address to the course instructor and moderator so that everyone in the course were added as participants of the course Wiki. The closed-group Wiki was done to ensure that students do not feel too shy or concern when participating in course Wiki as only their course mates and instructor can view their works instead of the public. In addition, the activities and group pages in Wiki were made viewable for everyone in the class so that students can look at their peers' works and provide constructive comments to each other. This is because, the activity of correcting peers' mistakes can help students in their writing progress, which in turn will improve their writing (Woo et al., 2011).

Throughout the semester, the course instructor constantly provide encouragement and reminders to the students in order to keep them motivated and ensure that they participate actively in the activities given (see Figure 3.4 below). This is to avoid inactive members and to ensure that the course Wiki remains active. The course instructors took on the role of facilitators and Wiki moderators. Both online and in-class activities were observed by the course instructors, which include monitoring students' activities in Wiki, their postings comments and discussions. Apart from that, students written activities in the class Wiki were continuously observed during and after class hours.

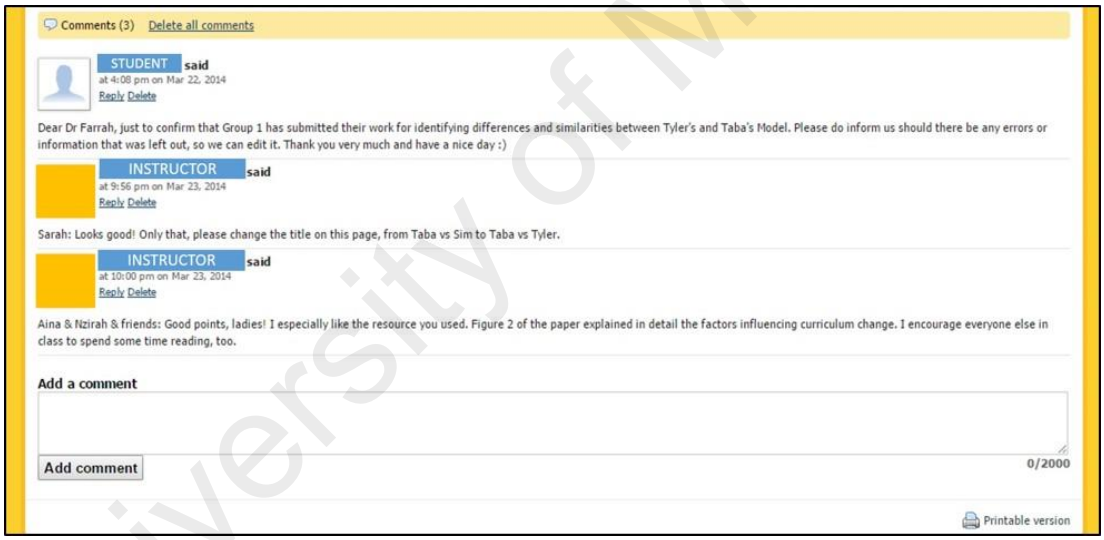

Figure 3.4. Screenshot of the commenting feature in the course Wiki (seen here is the conversation between students and course instructor using the commenting feature)

The observation was important to monitor the instructional activities and interactions that has taken place in the class Wiki. Even though online participations were not graded, the tracking progress in Wiki helped the instructor to observe students' contributions towards their writing task and to ensure that everyone participated so that task responsibilities were evenly distributed among group

members. Moreover, by tracking the students' progress and activities in Wiki, the course instructor can have a more in-depth information on how the students' collaborate with each other.

Since Wiki was used to supplement in-class teaching and learning activities, it is important to observe students during face-to-face meeting and take into account about the happening during the session. These include the difficulties the students faced while using Wiki in the classroom throughout the course.

For instance, students were unable to log in to the class Wiki due to certain reasons when they were supposed to complete their online tasks during class session. Wiki moderator need to step in and help rectify the situation immediately. This measure needs to be taken immediately to ensure the process of participating in the Wiki runs smoothly in order to encourage students' participation and avoid students to be frustrated with the issue, in which may in turn affect their motivation to participate. Both online and offline observations were carried out throughout the semester.

Research Instruments

In this study, the research data were collected throughout the semester, which ran for the duration of fourteen (14) weeks. Data collected includes online survey and focus group interview session.

Online survey. An online survey was administered to the students at the end of the fourteen (14) week course and was given prior to the final exam. The online survey was conducted in order to obtain feedbacks from the course participants in regards to their use of Wiki for collaborative learning that they have experienced throughout the course. The survey, entitled *"*Factors Influencing Students' Perception and Intention to Adopt Web-Based Collaboration Tool for Teaching and Learning Purposes" was conducted online and created using Google Form (refer Appendix B).

The link to the survey was given to the respondents via the class Wiki at the end of the course prior to the final exam and they were given a duration of two weeks to complete it. The link to the survey was as follows: https://docs.google.com/forms/d/1Qwl36UBiKDXrRe68zIxV5LgADPeVkMRDO2uWGYQXL8U/viewform)

The survey was written in dual language, which was in English and Bahasa Malaysia. The original version of the survey was written in English. However, for the purpose of this study, the survey was translated into Bahasa Malaysia using the back-to-back translation method. This was because Bahasa Malaysia is the main language in Malaysia, and some students may have difficulties in understanding the English version. The survey used the simplest sentence as possible to ease students' understanding of the question and also to avoid confusion. The screenshot of the front page of the online survey design can be referred to in Appendix C.

The survey comprised of four (4) sections, which are: (1) Section A (Demographic Characteristics and Technology Background); (2) Section B (Evaluation of Wiki to Supplement Class Instruction); (3) Section C (Learners' Perception towards the Pedagogical Benefits of Wiki); and (4) Section D (Students'

Intention to Use Wiki based on the Decomposed Theory of Planned Behaviour (DTPB) Scale).

The first section, which is Section A (Demographic Characteristics and Technology Background) comprised of three (3) subscales, which were: (1) Demographic Characteristics (nine items); (2) Language Proficiency (four items); and (3) Technology Knowledge and Background (nine items). This section collected information on respondents' demographic characteristics, such as year born, gender, technological equipment owned, total credit hours taken during the semester, time spent working on the course, Internet access, and technological backgrounds (Refer to Appendix D)

Section B (Evaluation of Wiki to Supplement Class Instruction) and Section C (Learners' Perception towards the Pedagogical Benefits of Wiki) of the survey were partially adapted from the study by Li et al. (2010) entitled "Students and teacher's attitudes and perceptions toward collaborative writing with Wiki in a primary four Chinese classroom" and also the study by Hazari and North (2009) entitled "Investigating pedagogical value of Wiki technology." Statements from the original version of the survey were modified accordingly to suit the need of this research and participants.

Section B comprised of nine (9) questions which are related to the use of Wiki to supplement classroom instruction (refer to Appendix E). Question number 1, 2, and 9 were single-answer question where respondents are allowed to choose only one answer by ticking on the box provided. The questions intended to find out about students' experience with Wiki, participation level, and also their intention to continue using it again in the future.

Question number 3, 4, and 5 were based on a five-point Likert-type scale (see Table 3.1 below) which focused on students' general opinion in regards to the usage of Wiki to supplement classroom instruction (e.g. "*In my opinion, the type and weight of class activities and assignments for this course were appropriate to be incorporated with Wiki*").

Question number 6, 7, and 8 were open-ended questions, which aimed to seek information in regards to students' Wiki participation (e.g. "*What factors influenced your participation in Wiki class activities or assignments?*" and "*What could be done to improve your participation?*") and comments about Wiki usage in the classroom (e.g. "*Are there any additional things or features that you would like to change or add to enhance the usage of Wiki in the class*?")

Table 3.1

Likert-Type Scale Response

Scale Response	Response
1	Strongly disagree
2	Disagree
3	Neither agree nor disagree
4	Agree
5	Strongly agree

Section C of the survey intended to elicit information regarding learners' perception towards the pedagogical benefits of Wiki in five (5) areas. The section comprised of five (5) sub scales which were; (1) Confidence in Writing; (2) Knowledge Sharing; (3) Improvement in Writing; (4) Group Interaction; and (5) Motivation. There were six (6) items in the Confidence in Writing sub scale, five (5) items in Knowledge Sharing, six (6) items in Improvement in Writing, four (4) items

in Group Interaction, and three (3) items in the Motivation sub scale. The questions were responded based on a five-point Likert-type scale as shown in Table 3.1 mentioned previously above.

The items in this section of the survey focused to seek learners' perception on whether Wiki is beneficial in five (5) areas, which are: (1) increasing their confidence in writing (e.g. *Using Wiki in class helped improve my confidence in writing"*); (2) facilitating knowledge sharing (e.g. *"The features of Wiki allows easy content and knowledge sharing"*); (3) increasing improvement in writing (e.g. *"Learning collaboratively using Wiki helped enhance the development of my writing skills.*"); (4) enhancing group interaction (e.g. *I like the use of Wiki during class session as it allows me to respond to and share ideas with my peers and lecturer."*); and (5) increasing their motivation (e.g. "*Compared with writing using pen and paper, I prefer writing on Wiki more"*). The construct and items for each of the sub-scales can be referred to in Appendix F.

The final part of the survey, which was Section D (Students' Intention to Use Wiki based on the Decomposed Theory of Planned Behaviour (DTPB) Scale) was designed based on the construct of the Decomposed Theory of Planned Behaviour (DTPB) by Taylor and Todd (1995). The questions was partially adapted from the study by Ajjan and Hartshorne (2008) entitled "Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests." The wording from the original statements were modified to suit the participants and situation.

There were thirty-seven (37) items in this section of the survey. The items were based on the four (4) factors presented earlier in the conceptual framework, which are: (1) Attitude (ATT), which consist of (Perceived Usefulness (PU), Ease of Use (EU), and Compatibility(COMP)); (2) Social Influence (SI), which consist of (Peer Influence

(PI) and Lecturer Influence(LI)); (3) Perceived Behavioural Control, which consist of (Self-Efficacy (SE), Technology Facilitating Condition (TFC), and Resources Facilitating Condition (RFC); and (4) Behavioural Intention (INT).

The items and construct in Section D which were based on the conceptual framework presented earlier in the thesis can be referred to in Appendix G. Items in the Behavioural Intention (BI) construct consisted of only two items (INT_1 and INT_2). However, since the analysis of the data were conducted using PLS-SEM method, there were no issue pertaining the lack of items in the construct. This is because, according to Hair, Ringle and Sarstedt (2011), the constructs' measurement properties are less restrictive with PLS-SEM, therefore constructs with fewer items, for example one or two, can be used with no issue (p. 140). PLS-SEM has the ability to handle single-item or fewer construct items with no identification problems (Hair et al, 2014).

Focus group interview. At the end of the semester, a focus group interview session was carried out with the course participants. The purpose of the focus group interview session was to seek additional information about their perceptions and experiences in using Wiki throughout their course of learning. The questions for the post-course focus group interview were attached in Appendix H.

A total of twenty-two (22) students from the course participated in the focus group interview. The participants were from the same group of students who enrolled in the Principles of Instructional Technology course and participated in the Wiki activities. The students were picked based on a voluntary basis, where the researcher asked earlier in class prior to the focus group interview session on who would like to join the session.

The focus group interview data were audio-recorded and the researcher took important notes during the session. However, prior to the focus group interview session, students were informed about the confidentiality and anonymity of the information given. They were also informed that the information and data gained from the focus group interview session will be used solely for research purposes. This was to ensure that the students will not feel shy or concerned in dispensing information and opinion throughout the session.

Pilot Study to Test the Reliability and Validity of Measurement

Prior to distributing the questionnaire to the real respondents, a pilot study was conducted on thirty (30) respondents in order to measure the reliability and validity of the research instrument. The characteristics of the respondents were almost similar to the targeted audience. The respondents for the pilot study were undergraduates in a public university which used Wiki as one of the tools in the classroom to supplement the teaching and learning process.

The assessment was done in two (2) sequential steps. The first step involved assessing the reliability of the research instrument using the Cronbach's alpha internal consistency method. Next, the validity assessment was conducted using the convergent validity and discriminant validity analysis in order to measure the construct validity.

Reliability of measurement scales using Cronbach's alpha internal consistency method. Reliability of a scale indicates how free it is from random error (Pallant, 2005). There are two most frequently used indicators of a scale's reliability, which are test-retest reliability and internal consistency (Pallant, 2005). For the pilot testing of this study, the reliability measurement used was assessing the internal consistency.

Internal consistency is conducted to check on the degree in which the items that make up the scale are all measuring the same underlying attribute, and it can be can be measured using the Cronbach's coefficient alpha (Pallant, 2005). The value of Cronbach's coefficient alpha ranges from 0 to 1, in which the nearer the values towards 1 indicates a greater reliability. According to Gliem and Gliem (2003), it is important to calculate and report Cronbach's alpha coefficient for internal consistency reliability of the scales that will be used in the questionnaire. The scores in a questionnaire can be considered reliable and accurate if the individual's score are internally consistent across every item in the instrument (Creswell, 2008).

Alpha coefficient value of 0.65 to 0.95 is categorized as satisfactory and indicated that the instrument used is reliable (Chua Yan Piaw, 2013). A low alpha coefficient value, which is less than 0.65 means that the ability of the items in the research instrument to measure the concept or variable is low, while a too high alpha coefficient value, which is higher than 0.95, means that the items are similar and overlapping (Chua Yan Piaw, 2013).

In addition of examining the Cronbach's alpha values, the item-total correlation values were also presented. The item-total correlation provides an indication of the degree to which each item correlates with the total score. The value

should be higher than 0.30, where values lower than that indicates that the item is measuring something different from the scale as a whole (Pallant, 2005).

Table 3.2 to Table 3.6 below presents the reliability testing for the measurement scales in Section C (Learners' Perception towards the Pedagogical Benefits of Wiki). The Cronbach's alpha coefficient values and its item-total correlation were calculated using IBM SPSS Statistics software version 22.0.

Based on the internal consistency analysis, the Cronbach's alpha coefficient values for Section C ranged from 0.830 (Motivation scale) to 0.949 (Knowledge Sharing scale). The values were shown to be above 0.65, indicating a good internal consistency and reliable (see Table 3.2 to Table 3.6 below).

The item-total correlation values for Section C ranged from 0.528 (CON_6) to 0.904 (KS_1). The item-total correlation values were shown to be higher than 0.30, providing an indication that the items do not measure something different from the scale as a whole (see Table 3.2 to Table 3.6 below).

Table 3.2

Multi-item reliability test result for the construct confidence in writing in Section C (Learners' perception towards the pedagogical benefits of Wiki) of the pilot study

	Items	Item-total correlation	Cronbach 's alpha value
Subscale 1: Confidence in Writing			
CON_1	Using Wiki in class helped improve my confidence in writing.	0.882	0.919
CON_2	I produce more text and input then required in my group Wiki page during class activities or assignments because it can boost my confidence in writing.	0.813	
CON_3	Since more people are able to read my group's work in Wiki, I become more active in writing.	0.765	

Table 3.2 continued

	Items	Item-total correlation	Cronbach's alpha value
Subscale 1: Confidence in Writing			
CON_4	Comments from lecturer boosted my confidence in writing using Wiki.	0.870	0.919
CON_5	Comments from peers boosted my confidence in writing using Wiki.	0.791	
CON_6	On the whole, the conflict among group members which happen when working in Wiki brought more benefits than disadvantages.	0.528	

Table 3.3

Multi-item reliability test result for the construct knowledge sharing in Section C (Learners' perception towards the pedagogical benefits of Wiki) of the pilot study

	Items	Item-total correlation	Cronbach's alpha value
Subscale 2: Knowledge Sharing			
KS_1	Looking at work done better than ours in Wiki motivated me to put in more effort in my own group's work.	0.904	0. 949
KS_2	The opportunity to look at other group's work in Wiki motivated me to put in more effort.	0.861	
KS_3	The features of Wiki allows easy content and knowledge sharing.	0.845	
KS_4	Opportunities to look at other groups' works in Wiki provides me with more perspectives as to how the work or task could be done.	0.902	
KS_5	When I write on Wiki, there are more audiences who viewed my work, which makes me more careful in my writings.	0.802	

Table 3.4

Multi-item reliability test result for the construct improvement in writing in Section C (Learners' perception towards the pedagogical benefits of Wiki) of the pilot study

	Items	Item-total correlation	Cronbach's alpha value
Subscale 3: Improvement in Writing			
IMP_1	Learning collaboratively using Wiki helped enhance the development of my writing skills.	0.786	0.925
IMP_2	Comments received from peers and lecturer in Wiki helped improved my writing skills.	0.861	
IMP_3	Commenting in my own and other group's Wiki page helped improved my writing skills.	0.849	
IMP_4	I think interaction among students in Wiki can better improve my writing ability compared with only interaction with the lecturer.	0.747	
IMP_5	The technology characteristics of Wiki helped improve my writing skills.	0.898	
IMP_6	I learned a lot from my own and other group members during class activities and assignments in Wiki, which in turn enriched my writing skills.	0.590	

Table 3.5

Multi-item reliability test result for the construct group interaction in Section C (Learners' perception towards the pedagogical benefits of Wiki) of the pilot study

	Items	Item-total correlation	Cronbach's alpha value
Subscale 4: Group Interaction			
GI_1	I learned a lot from my group members and other groups in Wiki during class activities and assignments.	0.861	0.891
GI_2	I was excited to discuss about Wiki activities and assignments with my peers and lecturer.	0.748	
GI_3	I learn better when reading and examining examples from other group's work in Wiki.	0.721	

Table 3.5 continued

	Items	Item-total correlation	Cronbach's alpha value
Subscale 4 : Group Interaction			
GI_4	I like the use of Wiki during class session as it allows me to respond to and share ideas with my peers and lecturer	0.729	

Table 3.6

Multi-item reliability test result for the construct motivation in Section C (Learners' perception towards the pedagogical benefits of Wiki) of the pilot study

	Items	Item-total correlation	Cronbach's alpha value
Subscale 5: Motivation			
MOT_1	Compared with writing using pen and paper, I prefer writing on Wiki more.	0.656	0.830
MOT_2	Wiki improved my interest in writing.	0.657	
MOT_3	The opportunity to post my work in Wiki for others to review encouraged me to work harder and produce better quality work.	0.775	

Table 3.7 below presents the reliability testing of the pilot test result for the measurement scales in Section D (Students' Intention to Use Wiki Based on the Decomposed Theory of Planned (DTPB) Scale) of the online survey.

From the table, it can be seen that the Cronbach's alpha coefficient values for section D ranged from 0.665 (Resource Facilitating Condition scale) to 0.943 (Perceived Usefulness scale). All the values are shown to be above 0.65 and this can be interpreted as having a good internal consistency, hence reliable.

The item-total correlation values for Section D (Students' Intention to Use Wiki Based on the Decomposed Theory of Planned (DTPB) Scale) ranged from 0.456 (SE_1) to 0.922 (PU_4). The item-total correlation values were found to be higher than 0.30, providing an indication that the items do not measure something different from the scale as a whole (refer Table 3.7 below).

Table 3.7

Multi-item reliability test result for constructs in Section D (Students' intention to use Wiki based on the Decomposed Theory of Planned (DTPB) scale) of the pilot study

Items		Item-total correlation	Cronbach's alpha value
Subscale: Ease of Use (EU)			
EU_1	I feel that Wiki will be easy to use.	0.792	0.842
EU_2	I feel that Wiki will be easy to incorporate in my future class.	0.733	
EU_3	I feel that the interface and features of the Wiki is easy to be understood.	0.606	
Subscale: Perceived Usefulness (PU)			
PU_1	I feel that Wiki will help me learn more about the subject.	0.869	0.955
PU_2	I feel that Wiki will improve my satisfaction with the academic subject.	0.898	
PU_3	I feel that using Wiki will improve my grades.	0.888	
PU_4	I feel that using Wiki will improve my evaluation in learning.	0.922	
Subscale: Compatibility (COMP)			
COMP_1	The scope of the course is suitable for Wiki to be incorporated with my learning.	0.832	0.912
COMP_2	Using Wiki fits well with my area of learning.	0.819	
COMP_3	I feel that the interface and features of the Wiki will help makes my collaborative writing process easier.	0.831	

Table 3.7 continued

	Items	Item-total correlation	Cronbach's alpha value
Subscale: Peer Influence (PI)			
PI_1	Peers, who influence my behaviour would think that I should use Wiki in the class.	0.734	0.869
PI_2	Peers, who are important to me think that I should use Wiki in the class.	0.822	
PI_3	My peers think the lecturer should use Wiki in the class.	0.714	
Subscale: Lecturer Influence (LI)			
LI_1	My lecturer, who influences my behaviour would think that I should use Wiki in the class.	0.809	0.867
LI_2	My lecturer, whom I report to would think that I should use Wiki in the class.	0.845	
LI_3	My lecturer convinces me the importance of the use of Wiki in my class.	0.615	
Subscale: Self-Efficacy (SE)			
SE_1	I am confident that I can use Wiki professionally.	0.456	0.777
SE_2	I could easily use Wiki on my own.	0.754	
SE_3	I would feel comfortable using Wiki.	0.650	
Subscale: Resource Facilitating Condition (RFC)			
RFC_1	I will be able to use Wiki using any computer connected to the Internet.	0.498	0.665
RFC_2	I will accept the use of Wiki if the faculty provides the needed environment for it.	0.498	
Subscale: Technology Facilitating Condition Scale (TFC)			
TFC_1	I will accept the use of Wiki if the faculty provides the needed technological instruments for it.	0.513	0.678
TFC_2	Wiki are compatible with the computer I use in the class.	0.513	

Table 3.7 continued

Items		Item-total correlation	Cronbach's alpha value
Subscale: Attitude Scale (ATT)			
AT_1	Wiki will be useful for my learning.	0.820	0.929
AT_2	The advantages of using Wiki outweighs the disadvantages of not using it.	0.843	
AT_3	Using Wiki is a good idea for learning my subject area.	0.906	
Subscale: Social Influence Scale (SI)			
SI_1	My peers will be using Wiki in their classes.	0.789	0.913
SI_2	My lecturer confirms my ability and knowledge to use Wiki in my future class.	0.880	
SI_3	My lecturer thinks it is important that I use Wiki for my class.	0.748	
SI_4	My peers think it is important that I use Wiki for my class.	0.758	
SI_5	My lecturer thinks I will benefit from using Wiki in my future class.	0.746	
Sub scale: Perceived Behavioural Control (PBC)			
PBC_1	Using Wiki is entirely within my control.	0.745	0.854
PBC_2	I have the knowledge and ability to use Wiki.	0.745	
Subscale: Behavioural Intention (BI)			
INT_1	I plan to use Wiki in my future class.	0.755	0.857
INT_2	I intend to use Wiki within the next semester.	0.755	

Validity of measurement scales. The validity of a measurement scale refers to the degree in which it measures what it intends to measure (Pallant, 2005). Construct validity is "the degree to which a measure assesses the construct it is purported to assess" (Peter, 1981). In this study two types of validity testing were conducted in order to measure construct validity. They were: (1) convergent validity; and (2) discriminant validity.

Convergent validity and discriminant validity were both used to measure the construct validity of measurement scales. Convergent validity refers to the degree in which a measure correlates positively with alternative measures of the same construct (Hair, Hult, Ringle & Sarstedt, 2014). On the other hand, discriminant validity refers to the extent in which a construct truly distinct from other constructs (Hair et al., 2014).

The sub-sections below explains the steps taken in conducting the validity testing of the measurement scales.

Validity testing for Section C (Learners' perceptions towards the pedagogical benefits of Wiki) of the pilot study. The validity of measurement scales in this section is explored using the Exploratory Factor Analysis (EFA) technique. Exploratory factor analysis was used in research to explore and gather information about the interrelationships among a set of variables (Pallant, 2005). Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test and Bartlett's test of sphericity (BTS) were used to assess the suitability of the data for factor analysis.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test varies between 0 and 1, where values closer to 1 indicates that patterns of correlations are relatively compact, so the factor analysis should yield distinct and reliable factors (Field, 2005). The Kaiser-Meyer-Olkin (KMO) measure can be interpreted as follows:

values below 0.50 as unacceptable, values between 0.50 and 0.70 are mediocre, values between 0.70 and 0.80 are good, values between 0.80 and 0.90 are great and values above 0.90 are superb (Hutcheson & Sofroniou, 1999, as cited in Field, 2005). The result for Kaiser-Meyer-Olkin (KMO) is 0.911 which indicated a superb level of prediction (refer Table 3.8 below).

The Bartlett's test of sphericity (BTS) significance level indicates the result of the test. The Bartlett's test of sphericity (BTS) should be significant ($p<0.05$) for the factor analysis to be appropriate (Pallant, 2005). For this study, the significance level of Bartlett's test of sphericity (BTS) is 0.000, indicating the data are appropriate for factor analysis (refer Table 3.8 below). Both of the results for Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity (BTS) tests shows that the data meet the requirements for factor analysis.

Table 3.8

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test and Bartlett's test of sphericity (BTS)

Test		Result
Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		0.911
Bartlett's Test of Sphericity (BTS)	Approx. Chi-Square	1987.389
	df	276
	Sig.	0.000

To determine the number of components or factors to be extracted, using the Kaiser's criterion, only components with eigenvalues that are greater than 1 will be extracted (Pallant, 2005). From the result, five (5) factors were extracted with eigenvalues greater than 1 (13.479, 2.056, 1.524, 1.395, and 1.012). These five components explained a total of 72.098% of the variance (shown in Table 3.9 below).

Table 3.9

Eigenvalues and Total Variance Explained

	Initial Eigenvalue			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
Factor	Total	% of Variance	Cumu-lative %	Total	% of Variance	Cumu-lative %	Total
1	13.48	29.92	49.92	13.48	49.92	49.92	10.46
2	2.056	7.614	57.54	2.056	7.614	57.54	8.866
3	1.524	5.646	63.18	1.524	5.646	63.18	9.025
4	1.395	5.166	68.35	1.395	5.166	68.35	7.587
5	1.012	3.748	72.10	1.012	3.748	72.10	5.988

Another test that can be used to determine the number of factors to be extracted is by using Scree Test. Scree Test involves plotting each of the eigenvalues of the factors and inspect the plot to find a point at which the shape of the curve changes direction and becomes horizontal (Pallant, 2005). It is recommended to retain all factors above the elbow, or break in the plot, as these factors contribute the most to the explanation of the variance in the data set (Pallant, 2005).

Figure 3.5 below displays the result of the Scree Test. From the table, it can be seen that the slope of the curve levels out at five (5) factors, thus resulting in five (5) components to be extracted.

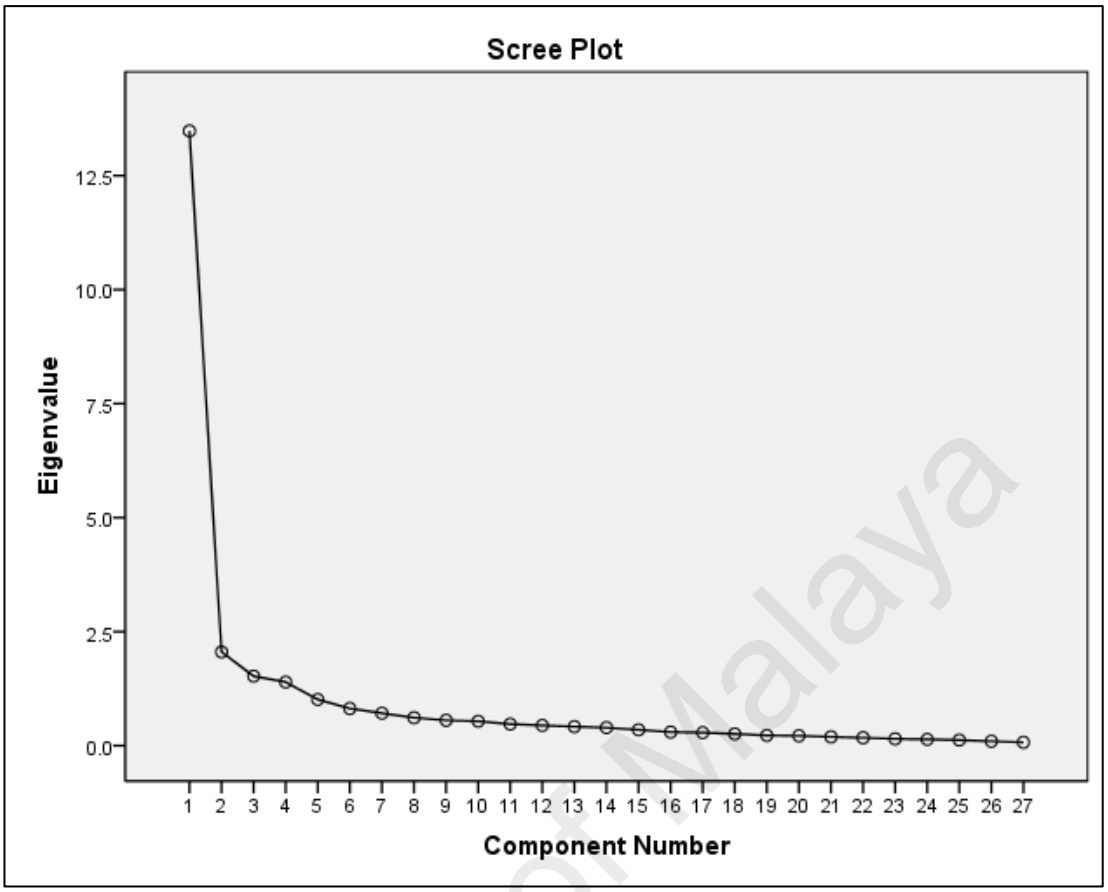

Figure 3.5. The Scree plot

Convergent validity. The convergent validity was measured based on items loading using composite reliability (CR) and the average variance extracted (AVE) values. Result can be seen in Table 3.10 below. The result indicated that all constructs exceeded the minimum requirement for validity.

The composite reliability (CR) showed that all constructs were above the acceptable value of 0.708. As suggested by Hair et al. (2014), values of composite reliability (CR) should be higher than 0.708. All items were also found to load strongly on their associated factors where the loadings are more than 0.50 and they load strongly on their associated factors and not on any others.

Hair et al. (2014) stated that the value of average variance extracted (AVE) should be more than 0.50. Referring to Table 3.10 below, it can be seen that Factor 3, which is improvement in writing, indicate somewhat low validity of average variance extracted (AVE), which is 0.473. However, other constructs demonstrated satisfactory level of average variance extracted (AVE) which is above 0.50.

Table 3.10

Factor analysis and convergent validity analysis

Factor/Constructs/Items	Item Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)
Factor 1: Confidence in writing		0.878	0.550
CON_1	0.851		
CON_2	0.846		
CON_3	0.792		
CON_4	0.695		
CON_5	0.619		
CON_6	0.604		
Factor 2: Knowledge sharing		0.840	0.516
KS_1	0.836		
KS_2	0.758		
KS_3	0.743		
KS_4	0.633		
KS_5	0.594		
Factor 3: Improvement in writing		0.838	0.473
IMP_1	0.938		
IMP_2	0.714		
IMP_3	0.700		
IMP_4	0.589		
IMP_5	0.579		
IMP_6	0.525		
Factor 4: Group interaction		0.860	0.612
GI_1	0.937		
GI_2	0.802		
GI_3	0.766		
GI_4	0.583		

Table 3.10 continued

Factor/Constructs/Items	Item Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)
Factor 5 : Motivation		0.756	0.515
MOT_1	0.864		
MOT_2	0.697		
MOT_3	0.560		

Discriminant validity. Discriminant validity is established by comparing the values of average variance extracted (AVE) associated with each construct to the correlations among constructs (Staples et al., 1999). Table 3.11 below shows the result of the discriminant validity analysis.

Table 3.11

Discriminant validity analysis

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	**0.742**				
Factor 2	0.451	**0.718**			
Factor 3	0.467	0.502	**0.688**		
Factor 4	0.512	0.418	0.527	**0.782**	
Factor 5	0.428	0.406	0.370	0.441	**0.718**

Note. Bold diagonal elements are the square roots of average variance extracted (AVE), while the off diagonal elements are correlations between constructs

The bold diagonal elements are the square roots of average variance extracted (AVE), while the off diagonal values are correlations between constructs. Discriminant validity is established when the value of the diagonal elements is larger than any other corresponding values.

The result in Table 3.11 below revealed that the square roots of average variance extracted (AVE) in the diagonal elements are larger than any of the correlations among constructs. Therefore, discriminant validity has been established.

Validity testing for Section D (Students' intention to use Wiki based on the Decomposed Theory of Planned Behaviour (DTPB) Scale) for the pilot study. The validity testing for Section D involved two types of assessment, which were the process of assessing the convergent validity, and also the discriminant validity.

Convergent validity using outer loadings and average variance extracted (AVE). Convergent validity involved assessing the extent to which a measure correlates positively with alternative measures of the same construct (Hair et al., 2014). There were two (2) aspects that need to be considered in establishing convergent validity. They were: (1) the outer loadings of the indicators; and (2) the average variance extracted (AVE).

In the examination of the outer loadings, Hair et al. (2014) suggested that the outer loadings value should be 0.708 or higher. On the other hand, average variance extracted (AVE) is the grand mean value of the squared loadings, where the value should be more than 0.50 (Hair et al., 2014).

Referring to Table 3.12 below, the outer loadings values for all of the indicators in the pilot test were higher than 0.708. Meanwhile, the average variance extracted (AVE) values for all constructs exceeded the minimum requirement of 0.50. Therefore, convergent validity has been established.

Table 3.12

Convergent validity analysis

Construct	Indicators	Outer Loadings	Average Variance Extracted (AVE)
Perceived Usefulness (PU)	PU_1	0.927	0.886
	PU_2	0.945	
	PU_3	0.935	
	PU_4	0.957	
Ease of Use (EU)	EU_1	0.915	0.759
	EU_2	0.887	
	EU_3	0.810	
Compatibility (COMP)	COMP_1	0.925	0.854
	COMP_2	0.918	
	COMP_3	0.929	
Peer Influence (PI)	PI_1	0.895	0.799
	PI_2	0.932	
	PI_3	0.853	
Lecturer Influence (LI)	LI_1	0.931	0.804
	LI_2	0.946	
	LI_3	0.806	
Self-Efficacy (SE)	SE_1	0.781	0.689
	SE_2	0.890	
	SE_3	0.816	
Resource Facilitating Condition (RFC)	RFC_1	0.825	0.746
	RFC_2	0.901	
Technology Facilitating Condition (TFC)	TFC_1	0.886	0.756
	TFC_2	0.853	
Attitude (ATT)	AT_1	0.913	0.879
	AT_2	0.938	
	AT_3	0.960	
Social Influence (SI)	SI_1	0.874	
	SI_2	0.931	
	SI_3	0.842	0.751
	SI_4	0.842	
	SI_5	0.840	
Perceived Behavioural Control (PBC)	PBC_1	0.934	0.872
	PBC_2	0.934	
Behavioural Intention (INT)	INT_1	0.937	0.878
	INT_2	0.936	

Discriminant validity using cross loadings and the Fornell-Larcker criterion. Discriminant validity involved the process of testing the extent to which a construct truly distinct from other constructs by empirical standards (Hair et al., 2014). This means that the construct uniquely measure the phenomenon that it intends to measure in which other constructs do not measure.

There were two methods involved in assessing discriminant validity. They were: (1) the examination of cross loadings; or (2) the Fornell-Larcker criterion. In this study, both methods were used to re-confirm the discriminant validity. In the examination of cross loadings, discriminant validity is established when an indicator's loading on a construct is higher than all of its cross loadings with other constructs (Hair et al., 2014).

Table 3.13 below shows the outer loadings, and cross loadings for each of the indicators. From the table, it can be seen that the outer loadings for every constructs are higher than all of the cross loadings with other constructs.

For example, the indicator AT_1 has the highest value for the loading with its corresponding construct AT_1 (0.913), while all cross loadings with other constructs were considerably lower (for example, AT_1 on COMP: 0.677).

This was also true for other COMP indicators, and also other indicators that measure EU, INT, LI, PBC, PI, PU, RFC, SE, SI, and TFC. The result indicated that the discriminant validity has been established.

Table 3.13

Assessment of constructs' outer loadings and cross loadings

	ATT	COMP	EU	INT	LI	PBC	PI	PU	RFC	SE	SI	TFC
AT_1	**0.913**	0.677	0.696	0.845	0.729	0.653	0.716	0.667	0.637	0.756	0.818	0.788
AT_2	**0.938**	0.727	0.814	0.915	0.907	0.602	0.821	0.900	0.634	0.788	0.869	0.781
AT_3	**0.960**	0.643	0.770	0.842	0.846	0.724	0.846	0.809	0.693	0.774	0.853	0.779
COMP_1	0.669	**0.925**	0.713	0.698	0.634	0.496	0.688	0.685	0.619	0.773	0.686	0.630
COMP_2	0.652	**0.918**	0.741	0.717	0.700	0.508	0.766	0.764	0.720	0.816	0.743	0.671
COMP_3	0.699	**0.929**	0.689	0.722	0.680	0.451	0.692	0.684	0.540	0.810	0.720	0.610
EU_1	0.728	0.673	**0.915**	0.685	0.704	0.653	0.665	0.679	0.670	0.760	0.706	0.703
EU_2	0.724	0.670	**0.887**	0.743	0.745	0.581	0.759	0.844	0.619	0.787	0.764	0.672
EU_3	0.673	0.677	**0.810**	0.612	0.746	0.670	0.732	0.651	0.721	0.796	0.751	0.762
INT_1	0.892	0.729	0.730	**0.937**	0.742	0.657	0.720	0.739	0.676	0.813	0.825	0.822
INT_2	0.845	0.716	0.734	**0.936**	0.843	0.482	0.781	0.889	0.595	0.735	0.850	0.712
LI_1	0.872	0.696	0.785	0.856	**0.931**	0.661	0.787	0.836	0.654	0.753	0.846	0.726
LI_2	0.852	0.697	0.762	0.808	**0.946**	0.606	0.795	0.827	0.571	0.775	0.875	0.770
LI_3	0.651	0.554	0.708	0.597	**0.806**	0.651	0.773	0.754	0.822	0.707	0.768	0.748
PBC_1	0.696	0.435	0.648	0.588	0.684	**0.934**	0.642	0.518	0.682	0.605	0.638	0.757
PBC_2	0.615	0.545	0.711	0.549	0.644	**0.934**	0.675	0.581	0.772	0.721	0.626	0.738
PI_1	0.770	0.777	0.770	0.735	0.815	0.524	**0.895**	0.844	0.659	0.775	0.871	0.674
PI_2	0.836	0.665	0.754	0.777	0.830	0.677	**0.932**	0.830	0.710	0.794	0.881	0.818
PI_3	0.659	0.625	0.680	0.625	0.689	0.707	**0.853**	0.746	0.874	0.736	0.718	0.711
PU_1	0.804	0.673	0.772	0.818	0.821	0.624	0.887	**0.927**	0.683	0.759	0.860	0.779
PU_2	0.810	0.774	0.785	0.853	0.834	0.506	0.831	**0.945**	0.683	0.797	0.874	0.712
PU_3	0.751	0.727	0.805	0.757	0.835	0.553	0.851	**0.935**	0.644	0.745	0.829	0.739
PU_4	0.834	0.720	0.776	0.838	0.893	0.533	0.837	**0.957**	0.692	0.757	0.892	0.753
RFC_1	0.726	0.583	0.730	0.681	0.731	0.578	0.735	0.699	**0.825**	0.712	0.748	0.754
RFC_2	0.513	0.588	0.616	0.518	0.594	0.751	0.703	0.565	**0.901**	0.683	0.631	0.692
SE_1	0.781	0.640	0.818	0.773	0.766	0.656	0.768	0.694	0.766	**0.781**	0.709	0.771
SE_2	0.702	0.768	0.740	0.681	0.674	0.589	0.653	0.573	0.677	**0.890**	0.735	0.764
SE_3	0.529	0.755	0.641	0.555	0.575	0.494	0.574	0.496	0.511	**0.816**	0.592	0.565
SI_1	0.777	0.737	0.716	0.771	0.809	0.483	0.862	0.835	0.648	0.727	**0.874**	0.727
SI_2	0.816	0.706	0.733	0.862	0.825	0.623	0.844	0.831	0.757	0.773	**0.931**	0.805
SI_3	0.679	0.624	0.756	0.729	0.806	0.518	0.823	0.827	0.729	0.729	**0.842**	0.656
SI_4	0.781	0.691	0.758	0.705	0.822	0.546	0.736	0.719	0.566	0.785	**0.842**	0.756
SI_5	0.766	0.599	0.718	0.800	0.754	0.762	0.743	0.661	0.696	0.771	**0.840**	0.742
TFC_1	0.742	0.627	0.692	0.678	0.743	0.736	0.667	0.575	0.799	0.785	0.737	**0.886**
TFC_2	0.709	0.568	0.730	0.752	0.705	0.653	0.769	0.819	0.633	0.703	0.788	**0.853**

In Fornell-Larcker criterion method, the square root of the average variance extracted (AVE) of each construct must be higher than the construct's correlation with any other construct in the model (Hair et al., 2014). The assessment of the Fornell-Larcker criterion are shown in Table 3.14 below.

Referring to Table 3.14, it can be seen that the square root of the average variance extracted (AVE) of every constructs were higher that the constructs' correlation with others. For example, the reflective construct ATT has a value of 0.937 for the square root of its average variance extracted (AVE). This value were then compared with all the correlation values in the ATT column.

The square roots of the average variance extracted (AVE) for all the reflective constructs were found to be higher than the correlations of the constructs with other latent variables in the path model. They were, ATT (0.937), COMP (0.924), EU (0.871), INT (0.937), LI (0.897), PBC (0.934), PI (0.894), PU (0.941), RFC (0.864), SE (0.830), SI (0.866), and TFC (0.869). The result indicated that the discriminant validity has been established.

Table 3.14

The Fornell-Larcker criterion

	ATT	COMP	EU	INT	LI	PBC	PI	PU	RFC	SE	SI	TFC
ATT	**0.937**											
COMP	0.729	**0.924**										
EU	0.814	0.773	**0.871**									
INT	0.927	0.771	0.782	**0.937**								
LI	0.887	0.726	0.839	0.846	**0.897**							
PBC	0.702	0.524	0.727	0.609	0.711	**0.934**						
PI	0.849	0.773	0.824	0.801	0.875	0.705	**0.894**					
PU	0.851	0.769	0.833	0.868	0.899	0.588	0.904	**0.941**				
RFC	0.698	0.675	0.767	0.678	0.753	0.778	0.826	0.718	**0.864**			
SE	0.825	0.765	0.795	0.826	0.831	0.710	0.760	0.812	0.801	**0.830**		
SI	0.804	0.775	0.849	0.849	0.827	0.676	0.826	0.819	0.786	0.772	**0.866**	
TFC	0.834	0.688	0.816	0.819	0.833	0.801	0.821	0.792	0.829	0.858	0.874	**0.869**

Determining the Validity of Qualitative Data

In this study, three (3) measures were taken to establish the validity of the qualitative data. The three (3) procedures were approached based on the suggestions by Creswell and Miller (2000) to increase the validity of data. They were: (1) triangulation; (2) researcher reflexivity, and (3) prolonged engagement in the field.

Triangulation. Triangulation is a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study (Creswell & Miller, 2000). Common themes or categories were looked at and any coinciding areas were removed.

For this study, data were collected through multiple methods, such as focus group interview and open-ended survey. According to Creswell and Miller (2000), "the narrative account is valid because researcher go through this process and rely on multiple forms of evidence rather than a single incident or data point in the study" (p. 127).

Researcher reflexibility. The second validity procedure taken in this study was researcher reflexibility. This procedure involved researcher to self-disclose their assumptions, beliefs, and biases whereby it may shape their inquiry (Creswell & Miller, 2000). It is important for researcher to acknowledge and describe their entering beliefs and biases early in the research process to allow readers to understand their positions (Creswell & Miller, 2000).

In this study, the role of the researcher was participatory, where she was the moderator of the class Wiki. The researcher was present throughout the face-to-face instruction and also in the class Wiki. However, during the Focus Group Interview

session, a few measures were taken to avoid bias during the interviews. The researcher avoided making assumptions to students' answers and asked the students to explain further about their answers.

Prolonged engagement in the field. Another validity procedure taken in the study was researcher's prolonged engagement in the field. In the study, the researcher stayed in the research site for a prolonged period of time, which was for the duration of fourteen (14) weeks. The researcher stayed throughout the course period until the end of the semester.

The third procedure was suggested by Creswell and Miller (2000) in which during the process of repeated observation, the researcher build trust with participants and establish rapport so that they are comfortable to disclose information. This is because, the longer the researcher stay in the field, the more pluralistic perspectives will be heard from participants, and the better the understanding of the context of participant view (Creswell & Miller, 2000, p. 128).

Data Screening Process

After the participants have completed the online survey, the collected survey data were then coded and keyed in using IBM SPSS Statistics software version 22.0. Prior to analyzing result, the data set were checked and screened for errors. Errors are values that fall outside of the range of possible values for a variable (Pallant, 2005).

First, frequencies of each variables were inspected to check for missing values. Next, depending on the type of variable, error can be checked using minimum and maximum value (for categorical and continuous variables), or mean score (for continuous variables).

If there are any out-of-range values detected, the data will then be looked at and corrected. After the errors have been corrected, it is recommended to repeat checking for frequencies to ensure that there are no more errors in the data file (Pallant, 2005).

Data Analysis

Table 3.15 below presents the overview of data analysis that were done in this study based on the research objectives and questions.

Table 3.15

An overview of the research objectives, research questions, data sources, and analysis procedures

Research Objectives	Research Questions	Data Sources	Analysis Procedure
Research Objective 1 To examine students' perceptions towards the pedagogical benefits of Wiki in terms of confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation.	Research Question 1 What are the overall students' profile on the pedagogical benefits of Wiki? 1.a How do students perceive the pedagogical benefit of Wiki in terms of confidence in writing? 1.b How do students perceive the pedagogical benefit of Wiki in terms of knowledge sharing? 1.c How do students perceive the pedagogical benefit of Wiki in terms of improvement in writing? 1.d How do students perceive the pedagogical benefit of Wiki in terms of group interaction?	Quantitative Data: Online survey (Section B and Section C) Qualitative Data: Open-ended survey and focus group interview	Quantitative Analysis : Descriptive analysis using IBM SPSS Statistics (Frequency, percentages, mean, and standard deviation) Qualitative Analysis: Constant comparative method

Table 3.15 continued

Research Objectives	Research Questions	Data Sources	Analysis Procedure
	1.e How do students perceive the pedagogical benefit of Wiki in terms of motivation?		
Research Objective 2 To investigate the relationship between the determinants (attitude, social influence and perceived behavioural control) and behavioural intention towards the use of Wiki.	Research Question 2 What is the relationship between the determinants (attitude, social influence, and perceived behavioural control) and students' behavioural intention towards the use of Wiki? 2.a What is the relationship between attitude and behavioural intention towards the use of Wiki? 2.b What is the relationship between social influence and behavioural intention towards the use of Wiki? 2.c What is the relationship between perceived behavioural control and behavioural intention towards the use of Wiki?	Quantitative Data: Online survey (Section D)	Quantitative Analysis : Inferential analysis - Correlation
Research Objective 3 To find out which factors (attitude, social influence and perceived behavioural control) best predict students' intention to use Wiki in the future.	Research Question 3 Which of the factors (attitude, social influence, and perceived behavioural control) best predict students' intention to use Wiki in the future?	Quantitative Data: Online survey (Section D)	Quantitative Analysis: Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 3.0

The collected data from online survey were analyzed quantitatively using IBM SPSS Statistics software version 22.0 and SmartPLS version 3.0. Quantitative data were analyzed using both descriptive and inferential statistics. Additionally the data were also analyzed using the partial least squares structural equation modelling (PLS-SEM) method based on the aim to answer the research questions. Qualitative data obtained from the open-ended survey and focus group interview were analyzed using the constant comparative method. This was also to answer the first research question.

Descriptive statistics, such as frequency, percentages, mean score, and standard deviation were used to analyze the first research objective, which is to examine students' perception towards the pedagogical benefits of Wiki in five (5) terms, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Inferential statistical analysis method, which is the Pearson product-moment correlation was used for hypothesis testing. Pearson product-moment correlation was used to test hypothesis for the second research objective, which was to investigate the relationship between the three (3) factors; (1) attitude; (2) social influence; and (3) perceived behavioural control, with behavioural intention towards the use of Wiki. Pearson-product-moment correlation was also used to analyze the third research objective, which was to examine the relationship between behavioural intention and students' actual Wiki usage.

Next, Partial Least Squares Structural Equation Modelling (PLS-SEM) approach were used to test the third research objective, which was to find out the factors that best predict students' intention to use Wiki in the future. Structural Equation Modelling, or SEM, is a second generation technique of multivariate analysis. Multivariate analysis involves the application of statistical techniques that

analyzed multiple variables simultaneously. Examples of the first-generation multivariate analysis techniques are regression, analysis of variance (ANOVA), exploratory factor analysis, cluster analysis, and multidimensional scaling (Hair et al., 2014).

Structural equation modelling (SEM) enable researchers to incorporate unobservable variables measured indirectly by indicator variables. There are two categories of SEM, which are Covariance-based SEM (CB-SEM) and Partial Least Squares Structural Equation Modelling (PLS-SEM). Covariance-based SEM (CB-SEM) is primarily used to revisit existing theories, as whether to confirm or to reject, while Partial Least Squares Structural Equation Modelling (PLS-SEM) is primarily used to develop theories in exploratory research (Hair et al., 2014).

PLS-SEM was chosen because the research objective involves theory development and prediction. Apart from that, PLS-SEM not only able to predict the relationship between independent and dependent variables, but also able to test out the overall relationship of the whole model when all the variables are involved.

Therefore, by using PLS-SEM, path models can be drawn out to illustrate the hypotheses and variable relationships that are examined when SEM is applied (Hair et al., 2014). The path model for Research Question 3 of this study is shown in Figure 3.6 below. In the diagram, the blue circles indicate the latent variables or constructs, while the yellow rectangles show the indicators items. On the other hand, the list of constructs and its indicators are displayed in Table 3.16 below.

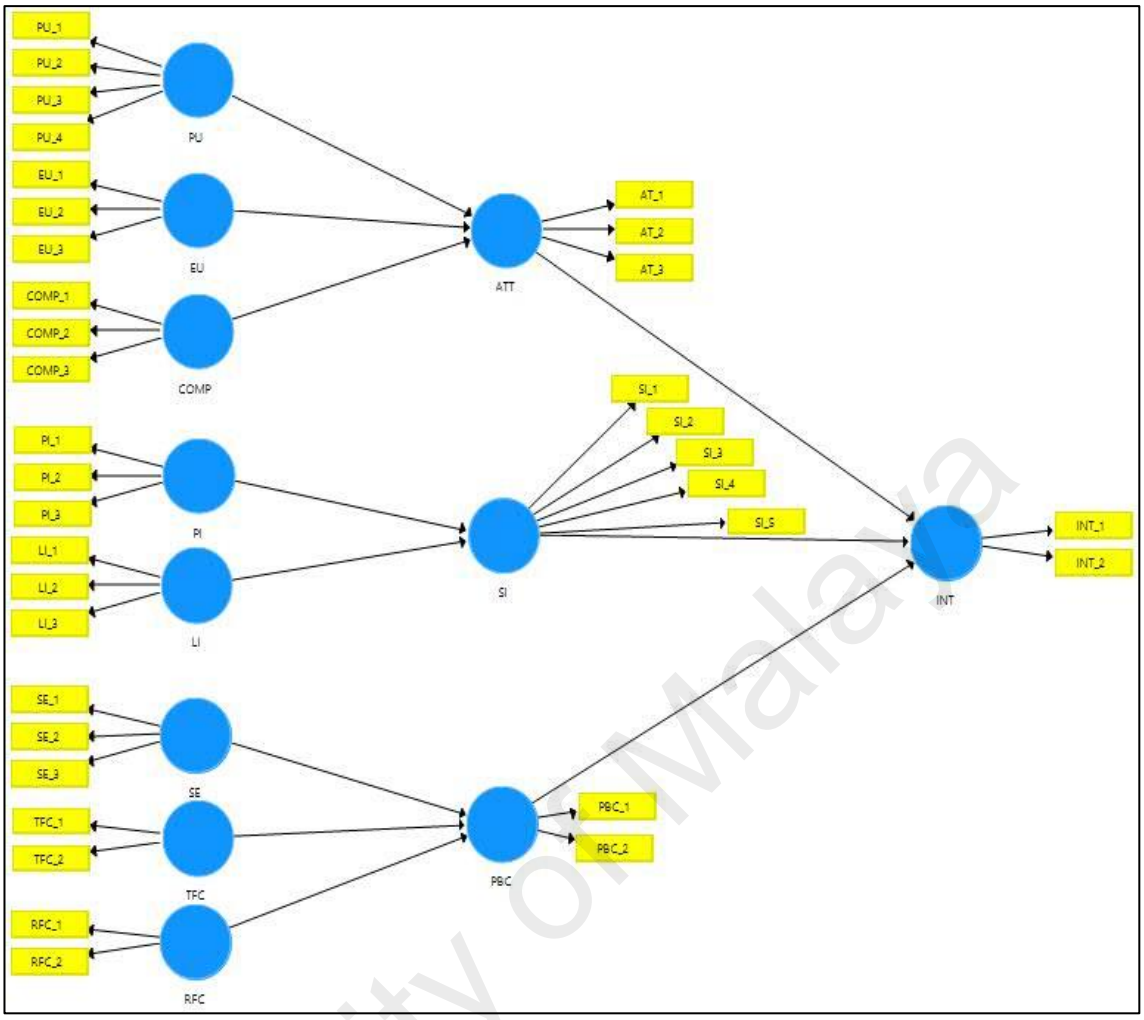

Figure 3.6. The research path model which displays the relationship between constructs and indicators for Research Question 3

Table 3.16

List of constructs and indicators for Research Question 3

Construct	Indicator	Number of Summated Scale
Ease of Use (EU)	EU_1, EU_2, EU_3	3
Compatibility (COMP)	COMP_1, COMP_2, COMP_3	3
Peer Influence (PI)	PI_1, PI_2, PI_3	3
Lecturer Influence (LI)	LI_1, LI_2, LI_3	3
Self-Efficacy (SE)	SE_1, SE_2, SE_3	3
Resource Facilitating Condition (RFC)	RFC_1, RFC_2	2
Technology Facilitating Condition (TFC)	TFC_1, TFC_2	2
Attitude (ATT)	AT_1, AT_2, AT_3	3
Social Influence (SI)	SI_1, SI_2, SI_3, SI_4, SI_5	5
Perceived Behavioural Control (PBC)	PBC_1, PBC_2	2
Behavioural Intention (INT)	INT_1, INT_2	2

Qualitative Data Analysis

The content analysis of the open-ended survey data and focus group interview resulted in the descriptions of the students' perception towards the pedagogical benefits of Wiki. Students' statements were initially examined and analyzed using the constant comparative method (Miles & Huberman, 1994). The steps involved the continuous process of comparing data.

The constant comparative method involved the process of systematically combining the data collected, coding, and analysis with theoretical sampling in order to generate theory that is integrated to the data (Conrad, Neumann, Haworth & Scott, 1993, in Kolb, 2012). The coding process involved analyzing and modelling the raw data into key concepts. The fit between each statement and the theme was analyzed

and later, each theme was given a label, and representative statements were selected (Li et al., 2012).

Three (3) types of coding are involved, which are: (1) open coding, where similar comments are grouped together to form categories; (2) axial coding, which involved the process of making connections amongst categories and sub-categories; and (3) selective coding, where core categories were identified and chosen . Using the five (5) pedagogical benefits of Wiki as a guide, the themes provided further explanation related to students' perception towards the pedagogical benefits of Wiki for teaching and learning purposes.

Summary of Chapter

This section highlighted the research methodology involved in this study, namely the research approach, research design, participants, sampling method, data sources, data collection procedures, and data analysis methods that were employed in order to answer the research questions and hypotheses. The data sources for this study were quantitative and qualitative data, in which both were gathered concurrently.

Quantitative data analysis involved the process of analyzing the data using IBM SPSS Statistics software version 22.0 and SmartPLS version 3.0. On the other hand, qualitative data involved analyzing the data using constant comparative method to obtain themes. Data were collected at the end of the semester which includes online survey and also focus group interview session.

CHAPTER 4

RESEARCH FINDINGS AND DATA ANALYSIS

Introduction

In this chapter, the research findings were discussed and data analyses were presented based on the research questions that this study aimed to answer. The quantitative data were obtained through online survey from one-hundred-nine (109) participants (n=109). Data were statistically analyzed using two statistical software, which were IBM SPSS Statistics software version 22.0 and SmartPLS version 3.0.

The quantitative data were presented using both descriptive and inferential statistics. On the other hand, the qualitative data, which were obtained from the open-ended survey and focus group interview were also presented in this chapter.

Respondents' Demographic Characteristics and Technology Background

An online survey was carried out with a total of one-hundred-nine (109) samples. The data were gathered and analyzed using IBM SPSS Statistics software version 22.0 and SmartPLS version 3.0

Demographic information (n=109). This sub-section presented respondents' demographic characteristics such as gender, ethnicity, hometown, programme of study, mode of study, current year of study, total credit hours taken in the semester, and also the technological equipment that the students owned.

Based on the result presented in Table 4.1 below, the respondents consisted of 84 (77.1%) female and 25 male (22.9%) students. The ethnicity distribution of the respondents were 88 (80.7%) Malay, 10 (9.2%) Chinese), 7 (6.4%) other races, and 4

(3.7%) Indian. In addition, the other races composed of 3 (2.8%) Bajau, 1 (0.9%) Bidayuh, 1 (0.9%) Indian Muslim, 1 (0.9%) Kadazan, and 1 (0.9%) Kedayan. All of the respondents, which were 109 (100.0%), enrolled in a full-time undergraduate degree programme in the university.

Table 4.1 displays the demographic information of the survey participants. Based on Table 4.1 below, a majority of respondents stated that the total credit hours that they have taken in the semester was 16 to 21 credit hours, 79 (72.5%), 17 (15.6%) 10 to 15 credit hours, 10 (9.2%) 3 to 9 credit hours, and 3 (28%) more than 21 credit hours.

Table 4.1

Demographic information of participants for the survey (n=109)

Demographic Information	Frequency	Percentage (%)
Gender		
Male	25	22.9
Female	84	77.1
Ethnicity		
Malay	88	80.7
Chinese	10	9.2
Indian	4	3.7
Others	7	6.4
Total credit hours taken in the semester		
3 to 9 credit hours	10	9.2
10 to 15 credit hours	17	15.6
16 to 21 credit hours	79	72.5
More than 21 credit hours	3	28

Table 4.2 displays the demographic information on technological equipment owned by the students. In regards to the technological equipment owned, referring to Table 4.2 below, 100 (91.7%) respondents reported that they did not own a desktop computer while 9 (8.3%) own a desktop computer. On the other hand, a majority of

the respondents owned a laptop computer, which was 102 (93.6%) students, while 7 (6.4%) did not own a laptop computer.

Referring to Table 4.2 below, a total of 100 (91.7%) respondents stated that they did not own a tablet, while 9 (8.3%) respondents owned a tablet. On the other hand, a majority of respondents, which were 65 (59.6%) respondents stated that they owned a smartphone, while 44 (40.4%) did not own a smartphone. A total of 88 (80.7%) respondents did not own a printer, while 21 (19.3%) owned a printer.

Based on Table 4.2 below, a majority of the respondents, which was 101 (92.7%) reported that they did not own a digital camera, while 8 (7.3%) owned a digital camera. In regards to the 3G or 4G mobile broadband, 94 (86.2%) respondents reported that they did not own it, while 15 (13.8%) owned it. A majority of respondents, which were 100 (91.7%) respondents stated that they did not own a wireless Internet, while 9 (8.3%) owned a wireless Internet.

Table 4.2

Demographic information on technological equipment owned by respondents (n=109)

Type of Equipment Owned	Frequency	Percentage (%)
Desktop computer		
Yes	9	8.3
No	100	91.7
Laptop		
Yes	102	93.6
No	7	6.4
Tablet		
Yes	9	8.3
No	100	91.7
Smartphone		
Yes	65	59.6
No	44	40.4

Table 4.2 continued

Type of Equipment Owned	Frequency	Percentage (%)
Printer		
Yes	21	19.3
No	88	80.7
Digital camera		
Yes	8	7.3
No	101	92.7
3G/4G mobile broadband		
Yes	15	13.8
No	94	86.2
Wireless internet		
Yes	9	8.3
No	100	91.7

Language proficiency (n=109). Table 4.3 below shows the distribution of respondents according to their level of language proficiency. Based on Table 4.3 below, a majority of respondents, which were 65 (59.6%) students reported that their level of verbal English proficiency was average. A total of 32 (29.4%) respondents reported that their level of verbal English proficiency was good, while 9 (8.3%) students reported to be weak, and 3 (2.8%) excellent. On the other hand, 70 (64.2%) respondents described their level of written English proficiency as average, 26 (23.9%) good, 9 (8.3%) weak, and 4 (3.7%) excellent.

Referring to Table 4.3 below, a majority of respondents, which were 55 (50.5%) students stated that their level of verbal Bahasa Malaysia language proficiency was good, 36 (33.0%) excellent, 15 (13.8%) average, and 3 (2.8%) weak. On the other hand, 55 (50.5%) respondents described their level of written Bahasa Malaysia language proficiency as good, 37 (33.9%) excellent, and 17 (15.6%) average.

It is important to look at the respondents' language proficiency level as it may affect their level of participation in class or Wiki as some may shy away from participating in the writing task due to their incompetency in language.

Table 4.3

Distribution of respondents according to language proficiency level (n=109)

Respondents' Language Proficiency Level	Frequency	Percentage (%)
English		
Verbal		
Weak	9	8.3
Average	65	59.6
Good	32	29.4
Excellent	3	2.8
Written		
Weak	9	8.3
Average	70	64.2
Good	26	23.9
Excellent	4	3.7
Bahasa Malaysia		
Verbal		
Weak	3	2.8
Average	15	13.8
Good	55	50.5
Excellent	36	33.0
Written		
Average	17	15.6
Good	55	50.5
Excellent	37	33.9

Technology knowledge and background (n=109). Table 4.4 below shows the distribution of respondents according to their level of computer and technology competency. A total of 61 (56.0%) respondents stated that they were fairly competent in using advanced features of a web browser, such as Internet Explorer, Mozilla Firefox, or Safari. On the other hand, 41 (37.6%) reported that they are competent in

using advanced features of a web browser, while 7 (6.4%) stated that they were less competent.

Based on the result, it was found that 52 (47.7%) of the respondents stated that they were fairly competent in using advanced features of the word processing software, such as the Microsoft Word or WordPad. A total of 51 (46.8%) respondents reported to be competent in using advanced features of a word processing software, while 6 (5.5%) were less competent.

From the findings, 52 (47.7%) respondents reported that they were less competent in using advanced features of a spreadsheet software, such as the Microsoft Excel or Apache OpenOffice. A total of 39 (35.8%) respondents reported that they were fairly competent in using the advanced features of a spreadsheet software, 14 (12.8%) respondents were competent, while 4 (3.7%) have no experience in using it.

A majority of respondents, which were 62 (56.9%) students stated that they were fairly competent in using advanced features of a presentation software, such as Microsoft PowerPoint, ClearSlide, or Prezi. A total of 40 (36.7%) respondents were competent in using advanced features of a presentation software, 6 (5.5%) were less competent, and 1 (0.9%) have no experience in using it.

The findings showed that all of the respondents were familiar with the basic use of computer and technology. This was one of the most important factors that need to be considered by course instructor when planning to incorporate Wiki in the class for teaching and learning purposes. This was due to the nature of Wiki, which runs on a web browser and user need to have a basic skill to operate a computer and also the Internet.

Table 4.4

Distribution of respondents according to proficiency in using computer and technology (n=9)

Computer and Technology Competency Level	Frequency	Percentage (%)
Web browser		
Less competent in using advanced features	7	6.4
Fairly competent in using advanced features	61	56.0
Competent in using advanced features	41	37.6
Word processing software		
Less competent in using advanced features	6	5.5
Fairly competent in using advanced features	52	47.7
Competent in using advanced features	51	46.8
Spreadsheet software		
No experience	4	3.7
Less competent in using advanced features	52	47.7
Fairly competent in using advanced features	39	35.8
Competent in using advanced features	14	12.8
Presentation software		
No experience	1	0.9
Less competent in using advanced features	6	5.5
Fairly competent in using advanced features	62	56.9
Competent in using advanced features	40	36.7

Access to the Internet when students are not in university's campus (n=109). Figure 4.1 below shows the distribution of respondents according to access to the Internet when students are not in the university's campus. A majority of respondents, which were 80 (73.4%) students, stated that they did not have access to Internet outside of the university's campus. A total of 29 (26.6%) respondents stated that they have access to the Internet when they are not in the university's campus.

This is an important factor that needs to be considered by the course instructor when she plans to give students a homework via Wiki as students need to have access to the Internet in order for them access the class Wiki when they are not in the

university's campus. When students do not have Internet access outside of the classroom, it may hinder their participation in the class Wiki outside class hours. This also may result in difficulties by the students to complete the given assignment when they do not have access to Wiki.

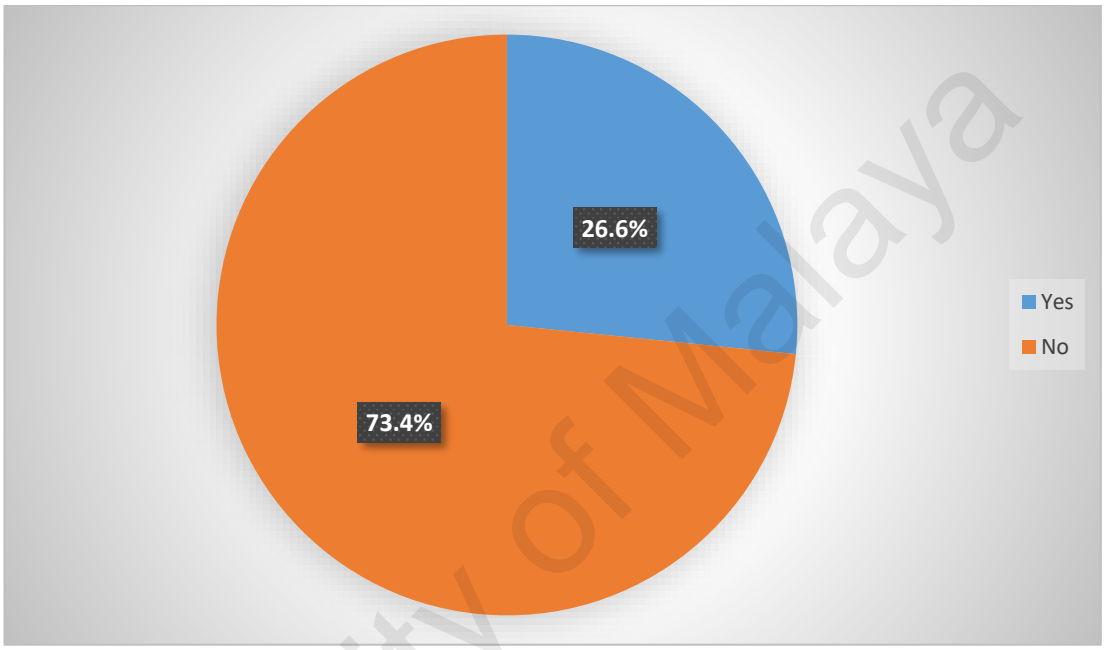

Figure 4.1. The distribution of respondents according to access to the Internet when students are not in the university's campus (n=109)

Type of Internet access (n=109). Figure 4.2 illustrates the distribution of respondents according to the type of Internet access that the students have. Based on Figure 4.2 below, a majority of respondents, which were 63 (42.2%) students stated that they did not have Local Access Network (LAN) or wireless network at home, while 46 (57.8%) respondents have it. On the other hand, 30 (27.5%) students have access to 3G or 4G mobile Internet access for smartphones or tablet, while 79 (72.5%) students did not have it.

Lastly, 23 (21.1%) students reported to have mobile broadband, while 86 (78.9%) did not have it. It was found that only a minority of students have access to the Internet when they are not in class, while a majority of students reported that they did not have access to Internet outside of the classroom.

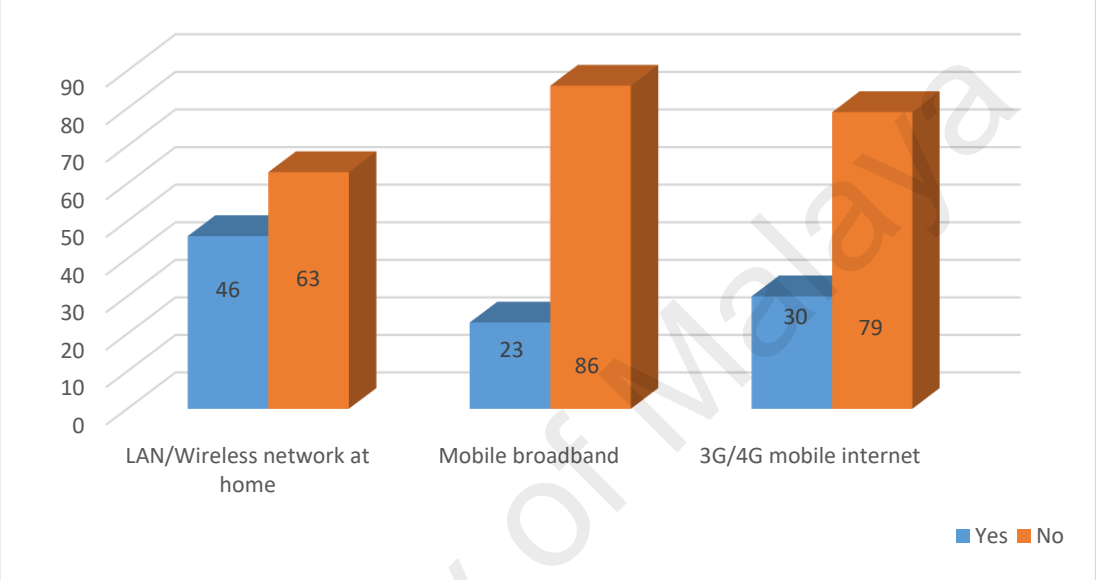

Figure 4.2. Types of Internet access (n=109)

Frequency of accessing the Internet (n=109). Figure 4.3 below displays the distribution of respondents according to frequency of accessing the Internet. A majority of respondents, which were 98 (89.9%) students, accessed the Internet two to three times a day.

On the other hand, five respondents (4.6%) accessed the Internet two to three times a week, five respondents (4.6%) accessed it once a week, and only one respondent (0.9%) accessed it once a month. This showed that a large number of learners were active Internet users where they frequently access the Internet.

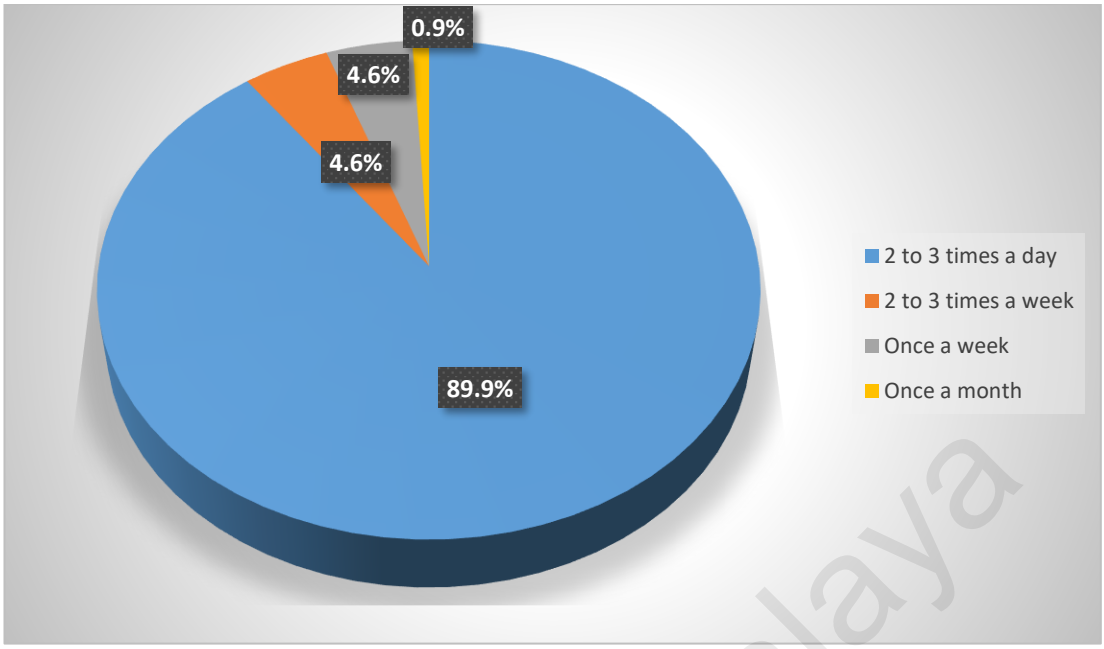

Figure 4.3. Distribution of respondents according to frequency of accessing the Internet (*n=109*)

Purpose of accessing the Internet (n=109). Table 4.5 below shows the distribution of respondents according to their purpose of accessing the Internet, whether for communication, leisure, or academic purposes. A majority of respondents, which were 75 (68.8%) students, reported that they accessed the Internet two to three times a day for communication purposes, while 21 (19.3%) students accessed it two to three times a week. Eight students (7.3%) reported that they accessed the Internet for communication purposes once a week, four students (3.7%) once a month, and one student (0.9%) never access it for communication purposes.

When asked about accessing the Internet for leisure purposes, a majority of respondents, which were 69 (63.3%) students accessed it two to three times a day, while 25 (22.9%) students accessed it two to three times a week. A total of 9 (8.3%) students accessed the Internet once a week for leisure purposes, 4 (3.7%) students accessed it once a month, and 2 (1.8%) students never access it for leisure purposes.

A majority of respondents, which were 57 (52.3%) students, accessed the Internet for academic purposes two to three times a day, while 37 (33.9%) students accessed it two to three times a week. A number of 10 (9.2%) students accessed the Internet for academic purposes once a week, 3 (2.8%) students accessed it once a month, and 2 (1.8%) students never access it for academic purposes.

Table 4.5

Distribution of respondents according to purpose of accessing the Internet (n=109)

Purpose of accessing the Internet	Frequency	Percentage (%)
Communication Purposes		
2 to 3 times a day	75	68.8
2 to 3 times a week	21	19.3
Once a week	8	7.3
Once a month	4	3.7
Never	1	0.9
Leisure Purposes		
2 to 3 times a day	69	63.3
2 to 3 times a week	25	22.9
Once a week	9	8.3
Once a month	4	3.7
Never	2	1.8
Academic Purposes		
2 to 3 times a day	57	52.3
2 to 3 times a week	37	33.9
Once a week	10	9.2
Once a month	3	2.8
Never	2	l.8

How students access the Internet to work for the course (*n=109*). Figure 4.4 below shows the distribution of respondents according to how students access the Internet to work for the course, whether on-campus or off-campus. Referring to Figure 4.4 below, a majority of respondents, which were 72 (66.1%) students, accessed the Internet to work for the course off campus, for instance at home or the hostel, while 37 (33.9%) respondents accessed it on campus, for example at the library or the faculty. This could be due to the fact that only a small number of learners have Internet access off-campus, which was reported previously.

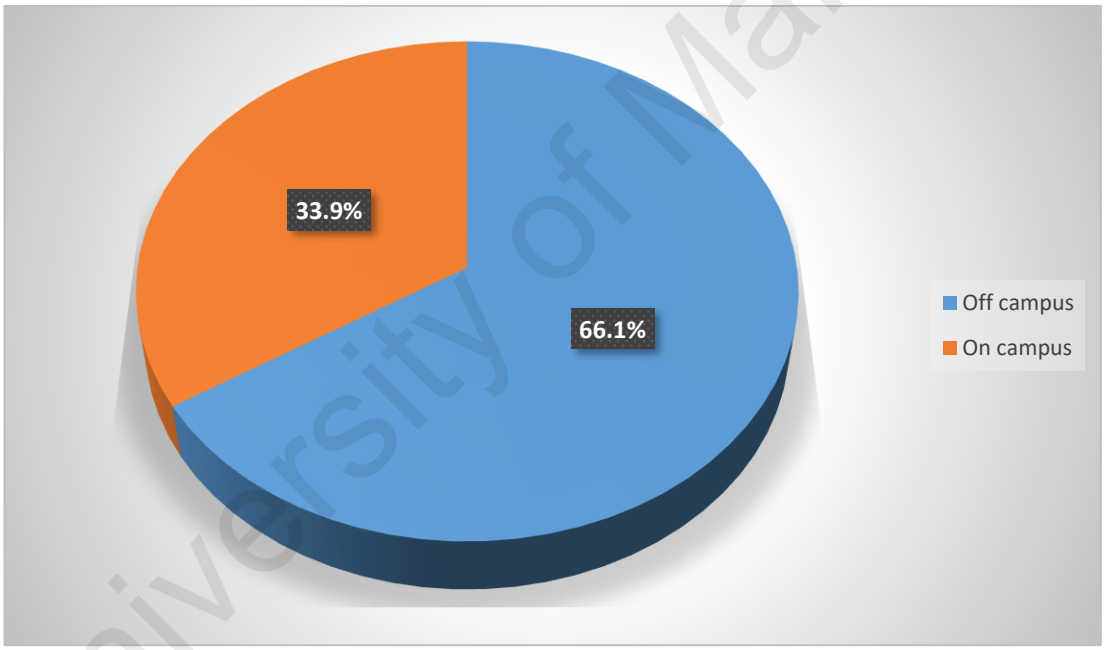

Figure 4.4. Distribution of respondents according to how the students access the Internet to work for the course (n=109)

Evaluation of Wiki to Supplement the Class Instruction

This sub-section presented respondents' evaluation of Wiki to supplement the classroom instruction.

First Wiki experience (n=109). Figure 4.5 below shows the distribution of respondents according to their Wiki experience. Based on Figure 4.5 below, a majority of respondents, which were 77 (70.6%) students, have never experienced Wiki prior to this course. On the other hand, a total of 32 (29.4%) respondents stated that they have used Wiki prior to the course.

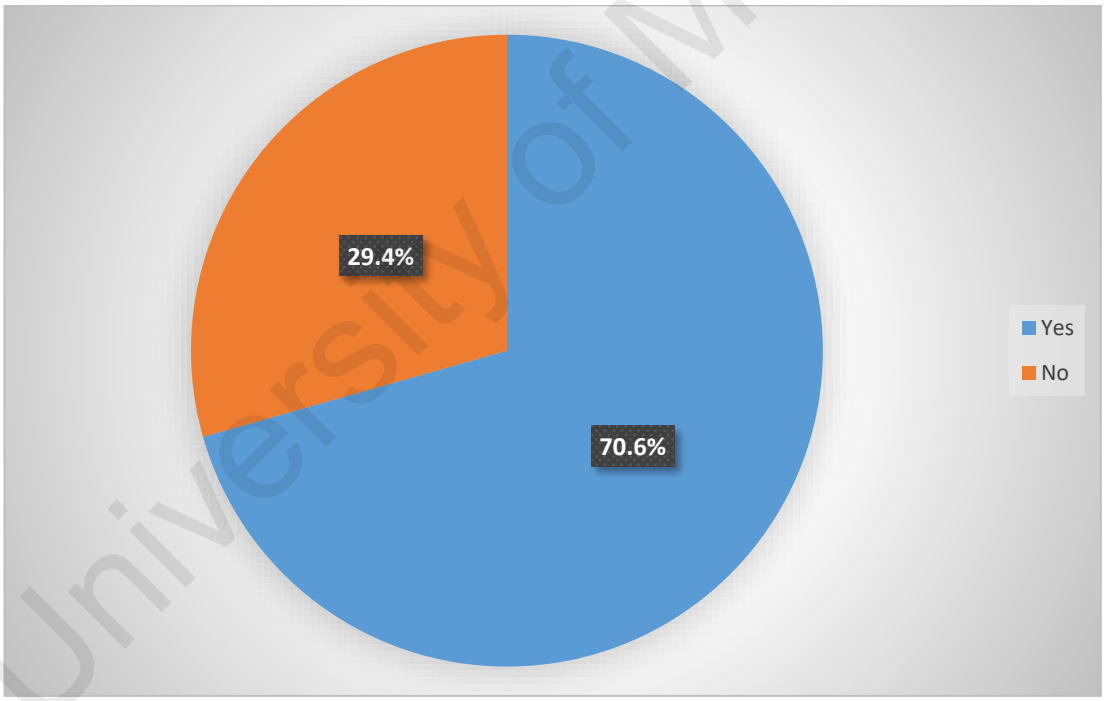

Figure 4.5. Distribution of respondents according to Wiki experience (n=109)

Frequency of participation in Wiki (n=109). Figure 4.6 below shows the distribution of respondents according to frequency of participation in the course Wiki. Based on Figure 4.6 below, a majority of students, which were 52 (47.7%) respondents participated in the course Wiki two to three times a week, while 27 (24.8%) respondents participated once a week. This was followed by 19 (17.4%) respondents, who participated in the class Wiki once a month, and lastly, 11 (10.1%) respondents participated two to three times a day.

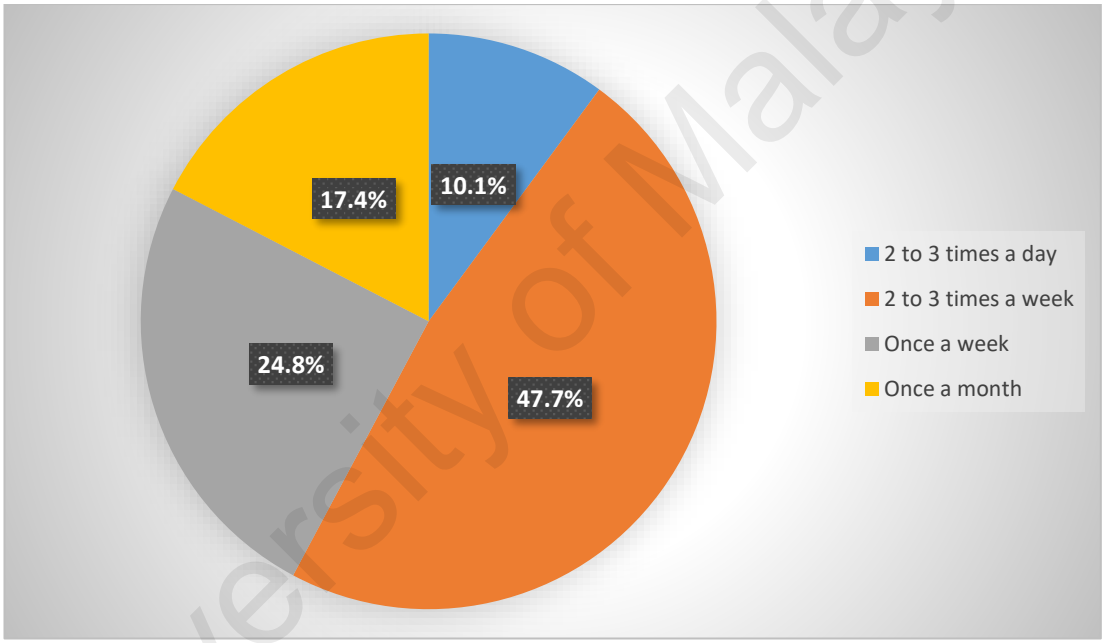

Figure 4.6. Distribution of respondents according to frequency of participation in Wiki (n=109)

Time spent each week working on the course Wiki (n=109). Figure 4.7 below illustrates the distribution of respondents according to time spent working on the course Wiki. Based on Figure 4.7 below, a majority of respondents, which were 60 students (55.0%) stated that they spent three to five hours each week working on the course Wiki, while 35 (32.1%) respondents spent two hours or less. A number of respondents, which were 10 (9.2%) students reported that they spent six to eight hours a week working on the course Wiki, while 4 (3.7%) spent nine hours or more.

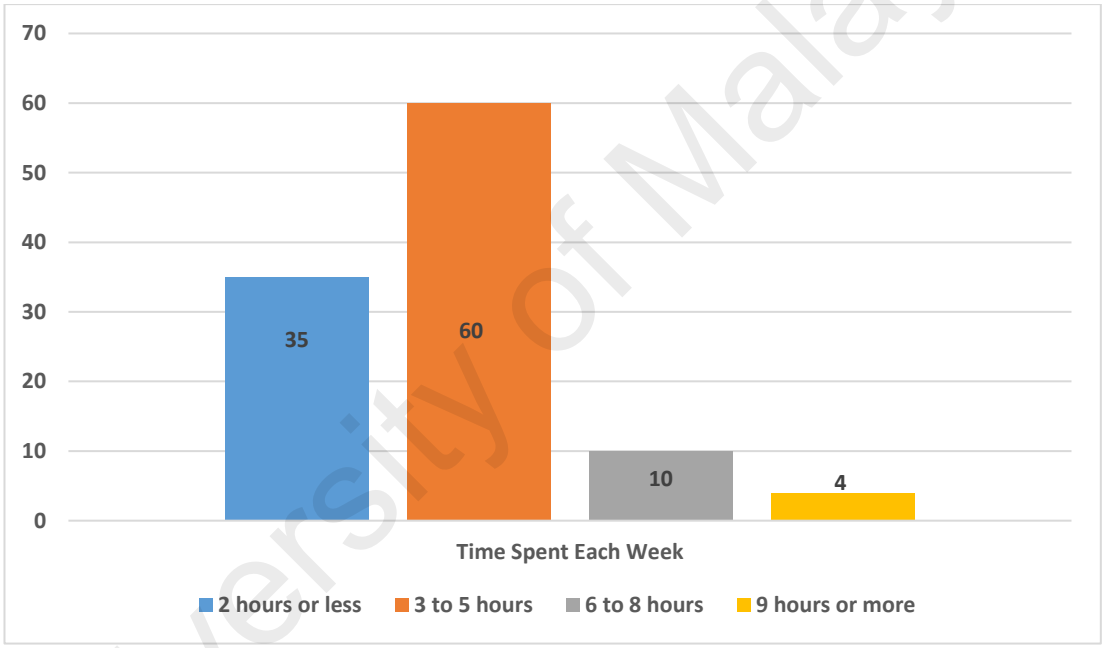

Figure 4.7. Distribution of respondents according to time spent working on the course Wiki (n=109)

Evaluation of Wiki to supplement class instruction. Table 4.6 below displays the distribution of respondents according to students' evaluation of Wiki to supplement class instruction. The results were presented using percentages (%), frequencies, mean, and standard deviation scores.

Mean is the average value, or the central tendency of the data. It is obtained by adding all the data obtained and divides it with the total number of points. In this study, it was based on the five-point Likert scale. Standard deviation explains the dispersion of scores in a distribution, in which how far the score deviates from the mean score in a distribution (Chua Yan Piaw, 2013).

Based on Table 4.6 below, result showed that 80 (73.4%) respondents, mean 3.86, agreed and strongly agreed to the statement "In my opinion, the type and weight of class activities and assignments for this course were appropriate to be incorporated with Wiki." The result also showed that 70 (64.3%) respondents, mean 3.67, answered "agree" and "strongly agree" when asked about the suitability of the course venue for the class activities to incorporate the use of Wiki in the class.

Result also showed that 76 (69.7%) respondents, mean 3.88, agreed and strongly agreed that the time spent in doing the course activities and assignments using Wiki was well worth the effort required.

Table 4.6

Distribution of respondents according to evaluation of Wiki to supplement class instruction (n=109)

Statement	Scale						
Students' evaluation towards Wiki	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
In my opinion, the type and weight of class activities and assignments for this course were appropriate to be incorporated with Wiki.	-	4 (3.7)	25 (22.9)	62 (56.9)	18 (16.5)	3.86	0.726

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Table 4.6 continued

Statement	Scale						
Students' evaluation towards Wiki	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
In my opinion, the venue for the course was suitable for the class activities to incorporate the use of Wiki in the class.	1 (0.9)	16 (14.7)	22 (20.2)	49 (45.0)	21 (19.3)	3.67	0.982
In my opinion, the time spent in doing the course activities and assignments using Wiki was well worth the effort required.	-	5 (4.6)	28 (25.7)	51 (46.8)	25 (22.9)	3.88	0.813

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Plan to continue using Wiki again in the future for teaching and learning purposes (n=109). Figure 4.8 below illustrates the distribution of respondents according to their plan to continue using Wiki again in the future for teaching and learning purposes. Based on Figure 4.8 below, a majority of respondents, which were 77 (70.6%) students stated that they planned to continue using Wiki again in the future for teaching and learning purposes, while 32 (29.4%) did not plan to do so.

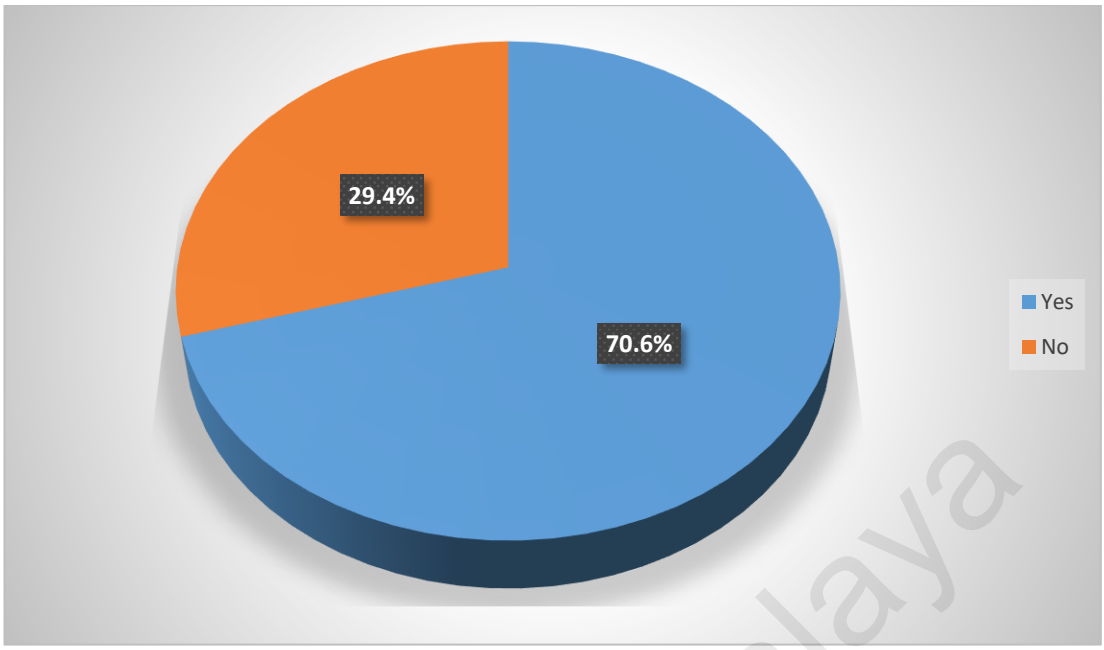

Figure 4.8. Distribution of respondents according to their plan to continue using Wiki again in the future for teaching and learning purposes (n=109)

Results and Data Analysis of the Research Questions

This sub-section presented the findings and the data analysis of the research questions that this study aimed to answer.

Results and data analysis for research question 1. The first research question that this research aimed to answer was as follows:

What are the overall students' profile on the pedagogical benefits of Wiki for online collaboration?

Descriptive statistics, such as frequency, percentages, mean score, and standard deviation (*SD*) were used to analyze the quantitative data for the first research question, which was to find out the overall students' profile on the pedagogical benefits of Wiki for online collaboration.

The qualitative data that were obtained from the open-ended survey and focus group interview were analyzed using the constant comparative method.

Quantitative data analysis. Prior to analyzing the data quantitatively, the scores from each question in the subscale were summed up in order to measure learner's perception towards the use of Wiki for collaboration purposes. Summed scores are the scores from an individual item which were added over several questions that measure the same variable in order to compute an overall score for the variable (Creswell, 2008).

By combining several items to form a scale or index, the overall composite score can be indirectly measured (Hair et al., 2014). The scores represented the learners' perception, whether it was low perception, medium perception, or high perception. The scores for each of the subscales were presented in Table 4.7 below.

Table 4.7

The summed scores of learners' perception towards Wiki according to their respective subscales

Subscale	Total of Summed Scores to Indicate Learners' Perception		
	Low Perception	Medium Perception	High Perception
Subscale 1: Confidence in Writing	6	18	30
Subscale 2: Knowledge Sharing	5	15	25
Subscale 3: Improvement in Writing	6	18	30
Subscale 4: Group interaction	4	12	20
Subscale 5: Motivation	3	9	15

Research question 1(a). The research question 1(a) that this sub-section aimed to answer was as follows:

How do students perceive the pedagogical benefit of Wiki for online collaboration in terms of confidence in writing?

Table 4.8 below shows the distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of confidence in writing. Based on Table 4.8 below, it was found that 72 (66.1%) respondents, mean 3.75, agreed and strongly agreed that using Wiki in class helped improve their confidence in writing.

Result also showed that 69 (63.3%) respondents, mean 3.69, produced more text than required in their group Wiki page during class activities or assignments because it can boost their confidence in writing. A majority of respondents, which was a total of 66 (60.6%) respondents, mean 3.66, responded "Agree" and "Strongly Agree" to the statement "since more people are able to read my group's work in Wiki, I become more active in writing", whilst 82 (75.2%) respondents, mean 3.84, agreed and strongly agreed to the statement "comments from lecturer boosted my confidence in writing using Wiki."

Result also indicated that 77 (70.6%) respondents, mean 3.85, agreed and strongly agreed that the comments received from their peers boosted their confidence in writing using Wiki. Finally, a majority of respondents, which were 70 (64.2%), mean 3.69, agreed and strongly agreed that on the whole, the conflict among group members which happen when working in Wiki brought more benefits than disadvantages to them.

Based on the result in Table 4.8 below, all items in the subscale showed a mean score above 3.00. This demonstrated a positive perception towards the pedagogical benefits of Wiki in terms of confidence of writing. The score obtained were based on a five-point scale which ranged between 1 to 5, where the maximum score was 5 for strongly agree and minimum score was 1 for strongly disagree. The mean score above 3.0 revealed that learners had positive perception towards the statement provided (Li et al., 2010).

Next, the range of the summed score for the Confidence in Writing subscale were between 6, indicating a low level of perception, to 30, indicating a high level of perception. The mean score above 18.0 demonstrated a positive perception towards the pedagogical benefits of Wiki in term of confidence in writing. Result from the statistical computation showed that the mean score for learners' confidence in writing was 18.80. This indicated that learners positively perceived Wiki as beneficial in facilitating their online collaborative in terms of confidence in writing.

Table 4.8

The distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of confidence in writing (n=109)

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of confidence in writing	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
1. Using Wiki in class helped improve my confidence in writing.	-	7 (6.4)	30 (27.5)	55 (50.5)	17 (15.6)	3.75	0.795
2. I produce more text and input then required in my group Wiki page during class activities or assignments because it can boost my confidence in writing.	-	9 (8.3)	31 (28.4)	54 (49.5)	15 (13.8)	3.69	0.813
3. Since more people are able to read my group's work in Wiki, I become more active in writing.	-	9 (8.3)	34 (31.2)	51 (46.8)	15 (13.8)	3.66	0.819
4. Comments from lecturer boosted my confidence in writing using Wiki	1 (0.9)	2 (1.8)	27 (24.8)	62 (56.9)	17 (15.6)	3.84	0.735
5. Comments from peers boosted my confidence in writing using Wiki.	-	3 (2.8)	29 (26.6)	58 (53.2)	19 (17.4)	3.85	0.731
6. On the whole, the conflict among group members which happen when working in Wiki brought more benefits than disadvantages.	2 (1.8)	10 (9.2)	27 (24.8)	51 (46.8)	19 (17.4)	3.69	0.930

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree

* Numbers in parentheses are percentages.

Research question 1(b). The research question 1(b) that this sub-section aimed to answer was as follows:

How do students perceive the pedagogical benefit of Wiki for online collaboration in terms of knowledge sharing?

Table 4.9 below shows the distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of knowledge sharing. Based on Table 4.9 below, a large number of respondents, which were 93 (85.3%) students, mean 4.07, agreed and strongly agreed that looking at the work done by other groups in Wiki which is better that theirs motivated them to put in more effort in their own group's work.

Result also showed that 82 (75.2%) respondents, mean 3.96, answered "Agree" and "Strongly Agree" to the statement "the opportunity to look at other group's work in Wiki motivated me to put in more effort." On the other hand, a majority of respondents, which were 95 (87.2%) respondents, mean 4.22, agreed and strongly agreed that the Wiki features allow easy content and knowledge sharing.

The result from Table 4.9 below also showed that 86 (78.9%) respondents, mean 4.05, agreed and strongly agreed to the statement "opportunities to look at other groups' works in Wiki provides me with more perspectives as to how the work or task could be done." Finally, 77 (70.6%) respondents, mean 3.90, agreed and strongly agreed that when they write on Wiki, there are more audiences viewing their work, thus making them more careful in their writings.

The mean score above 3.00 demonstrated a positive perception towards the statement given to them in the subscale. The score obtained were based on a five-point scale which ranged between 1 to 5, where the maximum score was 5 for strongly agree and minimum score was 1 for strongly disagree. The mean score above 3.0 revealed

that learners had positive perception towards the statement provided (Li et al., 2010). Referring to Table 4.9 below, the mean score for all items were found to be 3.00 and above. This showed the evidence of positive perception towards the pedagogical benefits of Wiki in terms of knowledge sharing was found for all items in the subscale.

Next, the range of the summed score for the Knowledge Sharing subscale were between 5, indicating a low level of perception, to 25, indicating a high level of perception. The mean score above 15.0 demonstrated positive perception towards the pedagogical benefits of Wiki in terms of knowledge sharing.

Result from the statistical computation showed that the mean score for knowledge sharing was 20.20. This indicated that the learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of knowledge sharing.

Table 4.9

Distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of knowledge sharing (n=109)

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of knowledge sharing	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
1. Looking at work done better than ours in Wiki, motivated me to put in more effort in my own group's work.	-	1 (0.9)	15 (13.8)	68 (62.4)	25 (22.9)	4.07	0.634

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree

* Numbers in parentheses are percentages.

Table 4.9 continued

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of knowledge sharing	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
2. The opportunity to look at other group's work in Wiki motivated me to put in more effort.	-	2 (1.8)	25 (22.9)	57 (52.3)	25 (22.9)	3.96	0.732
3. The features of Wiki allows easy content and knowledge sharing.	-	1 (0.9)	13 (11.9)	56 (51.4)	39 (35.8)	4.22	0.685
4. Opportunities to look at other groups' works in Wiki provides me with more perspectives as to how the work or task could be done	-	-	23 (21.1)	58 (53.2)	28 (25.7)	4.05	0.686
5. When I write on Wiki, there are more audiences who viewed my work, which makes me more careful in my writings.	-	2 (1.8)	30 (27.5)	54 (49.5)	23 (21.1)	3.90	0.745

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Research question 1(c). The research question 1(c) that this sub-section aimed to answer was as follows:

How do students perceive the pedagogical benefits of Wiki for online collaboration terms of improvement in writing?

Table 4.10 below displays the distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of improvement in writing. Result showed that 82 (75.2%) respondents, mean

3.89, agreed and strongly agreed that learning collaboratively using Wiki helped enhance the development of my writing skills.

On the other hand, a majority of respondents, which were 80 (73.4%) students, mean 3.90, agreed and strongly agreed that comments received from peers and lecturer in Wiki helped improve their writing skills. Result also showed that 79 (72.5%) respondents, mean 3.83, answered "Agree" and "Strongly agree" to the statement "commenting in my own and other group's Wiki page helped improve my writing skills."

Table 4.10 also showed that a large number of respondents, which were 83 (76.1%) students, mean 3.96, think that interaction among students in Wiki can better improve their writing ability compared with only interaction with the lecturer. From the table, it can also be seen that a large number of respondents, which were 77 (70.6%) students, mean 3.88, agreed and strongly agreed that the technology characteristics of Wiki helped improve their writing skills. Lastly, 81 (74.3%) respondents, mean 3.90, positively responded to the statement "I learned a lot from my own and other group members during class activities and assignments in Wiki, which in turn enriched my writing skills."

Referring to Table 4.10 below, the mean score for all items were found to be 3.00 and above. This provided evidence of positive perception towards the pedagogical benefits of Wiki in terms of improvement in writing was found for all items in the subscale. The score obtained were based on a five-point scale which ranged between 1 to 5, where the maximum score was 5 for strongly agree and minimum score was 1 for strongly disagree. The mean score above 3.0 revealed that learners had positive perception towards the statement provided (Li et al., 2010).

The range of summed score for the Improvement in Writing subscale were between 6, indicating a low level of perception, to 30, indicating a high level of perception. The mean score above 18.0 indicated a positive perception towards the subscale.

Result revealed that the mean score for improvement in writing and knowledge score was 19.46. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of improvement in writing.

Table 4.10

Distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of improvement in writing (n=109)

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of improvement in writing	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
1. Learning collaboratively using Wiki helped enhance the development of my writing skills.	1 (0.9)	1 (0.9)	25 (22.9)	64 (58.7)	18 (16.5)	3.89	0.712
2. Comments received from peers and lecturer in Wiki helped improved my writing skills.	-	1 (0.9)	28 (25.7)	61 (56.0)	19 (17.4)	3.90	0.680
3. Commenting in my own and other group's Wiki page helped improve my writing skills.	1 (0.9)	5 (4.6)	24 (22.0)	61 (56.0)	18 (16.5)	3.83	0.792

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Table 4.10 continued

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of improvement in writing	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
4. I think interaction among students in Wiki can better improve my writing ability compared with only interaction with the lecturer.	-	3 (2.8)	23 (21.1)	58 (53.2)	25 (22.9)	3.96	0.744
5. The technology characteristics of Wiki helped improve my writing skills.	-	1 (0.9)	31 (28.4)	57 (52.3)	20 (18.3)	3.88	0.703
6. I learned a lot from my own and other group members during class activities and assignments in Wiki, which in turn enriched my writing skills.	-	2 (1.8)	26 (23.9)	62 (56.9)	19 (17.4)	3.90	0.693

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Research question 1(d). The research question 1(d) that this sub-section aimed to answer was as follows:

How do students perceive the pedagogical benefits of Wiki for online collaboration in terms of group interaction?

Table 4.11 below shows the distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of group interaction.

A majority of respondents, which comprised of 81 students (74.3%), mean 3.84, agreed and strongly agreed to the statement "I learned a lot from my group members and other groups in Wiki during class activities and assignments." On the other hand, 74 (67.9%) respondents, mean 3.76, agreed and strongly agreed that they were excited to discuss about Wiki activities and assignments with their peers and lecturer.

Additionally, a majority of respondents, which were 69 (63.3%) students, mean 3.65, stated that they learned better when reading and examining examples from other groups' work in Wiki. Finally, result from the table showed that 79 (72.5%) respondents, mean 3.88, liked the use of Wiki during class session as it allows them to respond to, and share ideas with their peers and lecturers.

The mean score above 3.00 demonstrated a positive perception towards the statement given to them in the subscale. The score obtained were based on a five-point scale which ranged between 1 to 5, where the maximum score was 5 for strongly agree and minimum score was 1 for strongly disagree. The mean score above 3.0 revealed that learners had positive perception towards the statement provided (Li et al., 2010).

Referring to Table 4.11 below, the mean score for all items were found to be 3.00 and above. This showed that the evidence of positive perception towards the pedagogical benefits of Wiki in terms of group interaction was found for all items in the subscale.

The range of the summed score for this subscale were between 4, indicating a low level of perception, to 20, indicating a high level of perception. The mean score above 12 demonstrated the learners' positive perception towards Wiki in terms of group interaction.

Result showed that the mean for group interaction score was 15.14. This indicated that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of group interaction.

Table 4.11

Distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of group interaction (n=109)

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of group interaction	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
1. I learned a lot from my group members and other groups in Wiki during class activities and assignments.	-	5 (4.6)	23 (21.1)	65 (59.6)	16 (14.7)	3.84	0.722
2. I was excited to discuss about Wiki activities and assignments with my peers and lecturer.	2 (1.8)	4 (3.7)	29 (26.6)	57 (52.3)	17 (15.6)	3.76	0.827
3. I learn better when reading and examining examples from other group's work in Wiki.	2 (1.8)	8 (7.3)	30 (27.5)	55 (50.5)	14 (12.8)	3.65	0.865
4. I like the use of Wiki during class session as it allows me to respond to and share ideas with my peers and lecturer	-	1 (0.9)	29 (26.6)	61 (56.0)	18 (16.5)	3.88	0.677

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree

* Numbers in parentheses are percentages.

Research question 1(e). The research question 1(d) that this sub-section aimed to answer was as follows:

How do students perceive the pedagogical benefits of Wiki for online collaboration in terms of motivation?

Table 4.12 below shows the distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of motivation. Result showed that a majority of respondents, which were 60 (55.0%), mean 3.56, agreed and strongly agreed that they preferred writing on Wiki more in comparison with using pen and paper.

Next, it was also found that a majority of respondents, which were 60 (55.1%), mean 3.52, reported that Wiki improved their interest in writing. A majority of respondents, which were 75 (68.8%), mean 3.84, agreed and strongly agreed that the opportunity to post their work in Wiki for others to review encouraged them to work harder and produce better quality work.

To answer the research question, the evidence of positive perception towards Wiki in terms of motivation were found for all items in the Motivation subscale, where the mean score for each item were above 3.00. The score obtained were based on a five-point scale which ranged between 1 to 5, where the maximum score was 5 for strongly agree and minimum score was 1 for strongly disagree. The mean score above 3.0 revealed that learners had positive perception towards the statement provided (Li et al., 2010).

In the context of this study, learners' perception regarding the pedagogical benefits of Wiki in terms of motivation was based on the summed score of the Motivation subscale. The score ranged between 3, indicating a low level of perception

to 15, indicating a high level of perception. The mean score above 9 exhibits a positive perception towards Wiki in terms of motivation.

Based on the result obtained from the mean calculation, the mean of the summed score was 10.93. This showed that the learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of motivation.

Table 4.12

Distribution of respondents according to learners' perception towards the pedagogical benefits of Wiki for online Collaboration in Terms of Motivation (n=109)

Statement	Scale						
Learners' perception towards the pedagogical benefits of Wiki for online collaboration in terms of motivation	1 SD	2 D	3 N	4 A	5 SA	Mean	Std. Deviation
1. Compared with writing using pen and paper, I prefer writing on Wiki more.	2 (1.8)	12 (11.0)	35 (32.1)	43 (39.4)	17 (15.6)	3.56	0.947
2. Wiki improved my interest in writing.	2 (1.8)	14 (12.8)	33 (30.3)	45 (41.3)	15 (13.8)	3.52	0.949
3. The opportunity to post my work in Wiki for others to review encouraged me to work harder and produce better quality work.	-	4 (3.7)	30 (27.5)	54 (49.5)	21 (19.3)	3.84	0.772

Note. 1. Strongly Disagree; 2. Disagree; 3. Neither Agree nor Disagree; 4. Agree; 5. Strongly Agree
* Numbers in parentheses are percentages.

Summary of quantitative data analysis for Research Question (1). To answer the first research question, based on the summarized result in Table 4.13 below, it can be seen that learners positively perceived Wiki as beneficial in five (5) areas. The areas were: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing;

(4) group interaction; and (5) motivation. Table 4.13 below shows that the mean of summed scores for each subscales preceded their average summed scores.

The mean of summed score for learners' confidence in writing was 18.80, which was above the threshold value of 18.0 for positive perception. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaborative in terms of confidence in writing.

The mean of summed score for knowledge sharing was 20.20, which was above the threshold value of 15.0 for positive perception. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of knowledge sharing.

The mean of summed score for improvement in writing was 19.46, which was above the threshold value of 18.0 for positive perception. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of improvement in writing.

The mean of summed score for group interaction was 15.14, which was above the threshold value of 12.0 for positive perception. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of group interaction.

The mean of summed score for motivation was 10.93, which was above the threshold value of 9.0 for positive perception. This showed that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of group interaction.

In whole, the result showed that learners positively perceived Wiki as beneficial in five (5) areas, which were: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Table 4.13

Summary of students' perception towards the pedagogical benefits of Wiki

Subscale	Mean of Summed Scores	Perception	Note
Subscale 1: Confidence in Writing	18.80	Positive perception	The score ranges from 6 which denotes a "low perception" to 30 which denotes a "high perception". Mean score above 18.0 demonstrates a positive perception.
Subscale 2: Knowledge Sharing	20.20	Positive perception	The score ranges from 5 which denotes a "low perception" to 25 which denotes a "high perception". Mean score above 15.0 demonstrates a positive perception.
Subscale 3: Improvement in Writing	19.46	Positive perception	The score ranges from 6 which denotes a "low perception" to 30 which denotes a "high perception". Mean score above 18.0 demonstrates a positive perception.
Subscale 4: Group Interaction	15.14	Positive perception	The score ranges from 4 which denotes a "low perception" to 20 which denotes a "high perception". Mean score above 12.0 demonstrates a positive perception.
Subscale 5: Motivation	10.93	Positive perception	The score ranges from 3 which denotes a "low perception" to 15 which denotes a "high perception". Mean score above 9.0 demonstrates a positive perception.

Qualitative data analysis. The content analysis of the open-ended survey data and focus group interview resulted in the descriptions of the students' perception towards the pedagogical benefits of Wiki. Students' statements were initially examined and analyzed using the constant comparative method. The constant comparative method analysis involves the continuous process of comparing data. During the analysis process, all of the participants' names have been changed to retain anonymity and to ensure confidentiality.

The constant comparative method involved the process of systematically combining the data collected, coding, and analysis with theoretical sampling in order to generate theory that is integrated to the data (Conrad, Neumann, Haworth & Scott, 1993, as cited in Kolb, 2012). The coding process involved analyzing and modelling the raw data into key concepts. The fit between each statement and the theme was analyzed and later, each theme was given a label, and representative statements were selected (Li et al., 2012).

Three (3) types of coding were involved in the qualitative data analysis. During the first step of coding, which was the open coding, ninety seven (97) codes emerged from the statements from focus group interview and open-ended survey. This step was to develop an understanding of the possible categories. Next, in the axial coding step, thirty three (33) codes emerged in the process. This step was to make connections and identify patterns. Finally, in the third step, four (4) main themes emerged in the process. The themes are: (1) learning benefits; (2) collaboration benefits; (3) technology advantages; and (4) challenges.

Each theme is further explained by its sub-themes (refer Table 4.16 below). Table 4.14 below displays the four (4) main themes, its sub-themes, and examples of in vivo coding that are associated with the sub-themes. In vivo coding is the practice

of assigning a label to a section of data, such interview transcript, using a word or short phrase taken from that section of the data (King, 2008).

Table 4.14

The themes, sub-themes, and examples of in vivo coding from the qualitative data analysis

Themes	Sub-Themes and Examples of In Vivo Coding
Theme 1: Learning Benefits	1. Increase interest in learning In vivo coding: "fun", "exciting", "great", and "enjoyed" 2. Increase confidence in writing In vivo coding: "without feeling ashamed", "write more", and "more confident" 3. Increase knowledge In vivo coding: "learn better", "track back own learning", and "learn from others", "learn from mistake", and "explore more information"
Theme 2: Collaboration Benefits	1. Knowledge sharing ability In vivo coding: "can share sources", "read other's work", "interactive" 2. Fast and easy collaboration In vivo coding: "fast collaboration", "less chaos", "easy to discuss", "easy to compile work" 3. Group interaction In vivo coding: "can interact with lecturer", "ask question", "easy to discuss"
Theme 3: Technology Advantages	1. Ease of use In vivo coding: "easy to use", "not difficult", "not too bad" 2. Relevance of technology with lesson content In vivo coding: "relevance of class activity", "for assignment", "check for updates", "class is related to technology" 3. Novelty of new technology In vivo coding: "new experience", "never use before", "interesting", "curious", and "exciting"

Table 4.14 continued

Themes	Sub-Themes and Examples of In Vivo Coding
Theme 4: Challenges	1. Technology features In vivo coding: "waste of time", "must wait", "troublesome", "bored of waiting", "hope for more features" 2. Technical issues In vivo coding: "slow Internet", "no connection", "not stable", "disruption", "size limitation" 3. Distractions In vivo coding: "too many things going on", "so many groups", "browse other websites"

Theme 1: learning benefits. From the analysis of the focus group interview and open-ended survey, it was found that Wiki was beneficial in increasing students' interest to learn the subject matter. Students find Wiki to be fun and enjoyable to be use for their teaching and learning process. Learning via Wiki is a good way to provide motivation to students and increase their interest in learning. As commented by the participants in the focus group interview session:

"I want to learn how to use Wiki properly because I am curious and it is fun"

(Alia, Focus group interview)

"The social tool is attractive and fun… it will definitely make me feel excited to involve in class"

(Muhammad, Focus group interview)

The curiosity and excitement when using Wiki for their teaching and learning purposes showed that students have positive attitude towards Wiki. This was a good indicator that will lead to an increase of students' Wiki usage. Another student commented in the open ended survey:

"I think to use it (Wiki) for my learning would be extra fun and exciting"

(Aidan, Open-ended survey)

In addition, students also made favourable comments towards the use of Wiki for their learning where they used terms such as "fun", "exciting", "great", and "enjoyed" when asked to describe about their feeling when using Wiki for their course. This showed that Wiki was beneficial in increasing students' interest in learning. It was also reported that by using a technological tool and shifting away from the traditional concept of face-to-face teaching and learning proved that it could increase students' interest. For instance, a student described the use of Wiki in the classroom session:

"The tool itself is attractive and fun, it will definitely make me feel excited to involve in collaborative learning"

(Melissa, Focus group interview)

Students' increased motivation can also be seen in their increased interest in learning. The result was generally in-line with the survey findings where it was found that students' became more interested and more motivated in their learning when using Wiki. In addition, encouragements and feedbacks received from peers and course instructor via the commenting feature in Wiki could increase students' confidence in writing, thus increases their motivation to learn. Some of the comments for Wiki which were related with confidence in writing were:

"I like when our lecturer give immediate comments about our work or whenever we ask question. At least I know what I'm doing is right or not"

(Dina, Focus group interview)

"Through this tool I could talk more openly without having to feel ashamed with my friends compared to answering verbally in class. I prefer this medium for discussing"

(Leia, Focus group interview)

This showed that the public nature of Wiki, where everyone was able to view the work of others and leave comments, has the ability to encourage learners to be more active in their learning process. When students are more actively involved and take on a participatory role in their learning process, it could promote further understanding of the subject matter content through Wiki as compared to just being a passive receiver of knowledge. This was also supported by a student's response in the open-ended survey where she stated that:

"I can write and share my ideas more easily in Wiki than in class"

(Aina, Open-ended survey)

From the qualitative data analysis, many students cited that they are more confident working on Wiki as compared to participating in the face-to-face class session. This was based on the comments made by students such as learn better", "track back own learning", and "learn from others", "learn from mistake", and "explore more information" which explained their preference in using Wiki for their learning process.

This showed that Wiki has the ability to provide students with a conducive online learning environment which could increase their confidence to actively take part in the learning activities. This may be due to the open platform of Wiki where students write to a broad audience instead of just writing and submitting their work to the course instructor. This helped increase communication and in turn, encouraging the collaboration act to happen.

During the focus group interview session, the participants appeared to have the same consensus that using Wiki in the classroom increased their knowledge of the subject matter. This can be seen by the comments made by the students such as "learn better", "track back own learning", "learn from others", "learn from mistake", and

"explore more information". For example, a student described her increased knowledge when using Wiki:

"I love discussing with my course mates and lecturer in Wiki as it makes me think more"

(Hana, Focus group interview)

The technical features of Wiki allows user to track their learning easily. This gives student opportunity to look back at their mistakes and self-reflect on their own writing. In addition, their peers and lecturer could also help them to correct their mistakes. Another comment was made by a student in the open-ended survey which was related to the ability of Wiki in improving students' learning:

"I can search for more information and get immediate knowledge when using Wiki together in class. For example, when my instructors showed us something new, we can immediately search the new information on the website. It is immediate and convenient, and helps a lot"

(Joanne, Open-ended survey)

Similar comment was also made by a student during focus group interview:

"The use of computer and tool in the class allows student to explore more, share with friends, and do research while listening to lecture or sitting in the class, which is easier"

(Liza, Focus group interview)

Using Wiki to supplement the teaching and learning process in the class also allowed user to explore more knowledge, for instance, searching the Internet, whilst attending to the lecture. Users were allowed to explore more knowledge, get more information directly from the Internet and track their learning.

Theme 2: collaboration benefits. From the thematic analysis of both focus group interview and open-ended survey data, it was found that Wiki is beneficial for online collaboration purposes. The collaboration benefits made it a useful tool to be incorporated in class as it allows knowledge sharing ability. The technical characteristics of Wiki enable users to have a two-way communication and this allows knowledge sharing effort to take place. As commented by a participant in the focus group interview:

> *"Collaboration is fun… better than working alone. (I) can read other people's work and see how other group do it"*
>
> *(Elin, Focus group interview)*

In addition, one of the advantages of Wiki that a majority of students agreed upon was that they can work together even outside of their class time. This increased their productivity as they can continue working on their task even when they were not in the class. When using Wiki, students can interact and discuss with each other regardless of their geographical location. They do not have to be simultaneously present in class or campus to be able to complete their learning activities and tasks. The researcher also noted that students actively shared resources in the Wiki during and after class hours with their classmates.

The features of Wiki allows collaboration to take place between two or more people in a fast manner regardless of their location and time. Apart from that, collaborating via Wiki allows students to actively share resources with their friends in class in a less chaotic way. One of the comments for Wiki which were related with knowledge sharing were:

"It is hard to gather with my group mates for a discussion since everyone lives far from each other… it is easier to compile our work when we type it using the tool"

(Nina, Focus group interview)

This was also agreed by a student in the open-ended survey, where she stated that:

"I can discuss with my classmates and lecturer if they are outside of the classroom or in the hostel… in addition, it is very easy for all of us to know the latest information from the lecturer through Wiki"

(Gina, open-ended survey)

The social and collaborative affordances of Wiki allows the exchange of information and discussion to happen. This was further supported by students' positive comments towards the use of Wiki for collaboration purposes where they used terms such as "can share sources", "read other's work", "interactive" when asked to describe about Wiki's knowledge sharing ability.

Wiki also enable fast and easy collaboration effort to happen. This was due to the nature of Wiki which enables direct authoring on the web browser. As stated by a student during the focus group discussion:

"I can interact with my classmates and lecturer… I can also get information and feedback faster whenever I ask a question to my lecturer as compared to using email or wait until my class time"

(Nora, Focus group interview)

This was further supported by a student's comment in the open-ended survey, where she stated that:

"I can interact with my lecturer and get immediate feedback from her about the course and assignments"

(Lisa, Open-ended survey)

When using Wiki for their learning, students can obtain immediate feedback from the course instructor and also their peers. This was supported by positive remarks such as "fast collaboration", "less chaos", "easy to discuss", "easy to compile work" which were made by students during the focus group interview and open-ended survey.

Regarding the ability to support group interaction, representative views such as "can interact with lecturer", "ask question", "easy to discuss" were made by students. This was a positive indicator that the interactive nature of Wiki allows collaboration effort to happen when students interact with each other and also with their course instructor. As commented by a participant in the focus group interview:

"It is very interactive and useful for me as a student to share things with my friends"

(Nadia, Focus group interview)

This was further supported by a student's comment in the open-ended survey where she stated that:

"Easy to discuss anything about assignment and activities with friends and lecturer"

(Maria, Open-ended survey)

As Wiki allows collective feedback and transparency in sharing their work, students can work together and support each other in their learning process.

Theme 3: technology advantages. From the content analysis of the focus group interview and open-ended survey, it was found that the features of Wiki has many advantages which makes it beneficial for it to be incorporated in learning. Apart from that, the ease of use of Wiki makes it easier for users to use it.

A large number of students perceived that Wiki was considerably easy to use. This may due to the characteristic of Wiki which does not require users to have an extensive technological knowledge to use it. This proved to be a technological advantage of Wiki where user can focus on their learning task and assignments instead of busy navigating and learning how to move around the tool. As commented by the students in the focus group interview and open-ended survey:

"No. I think Wiki is not difficult to use"

(Hanee, Focus group interview)

"I am used to computers so I have no issue with Wiki. It is easy to use"

(Suraya, Open-ended survey)

If the students perceived that Wiki was easy to use, there is a higher probability that they will use it for their course. Students' perceived ease of use can be seen by the comments made such as "easy to use", "not difficult", and "not too bad".

From the analysis, the relevance of Wiki technology when incorporated with the lesson was also one of the factors that motivated the students to use Wiki. As one student commented about the relevance of technology used with lesson content that could be beneficial in increasing students' motivation was:

"The relevance of class activity incorporated (with Wiki) makes me more interested to use it and which I find it helpful"

(Julia, Focus group interview)

Some representative views about the relevance of technology with lesson contents are “relevance of class activity”, “for assignment”, “check for updates”, and “class is related to technology”. It is important for course instructor to take note on the lesson content and activities, and decide whether the class structure is suitable to be incorporated into Wiki or not.

In addition, students found the novelty of using new technology in the classroom increased their interest in using it. As these students commented in the focus group interview and open-ended survey:

“Wiki is new to me and it is more interesting than normal classroom… and hope it will help us in our learning process”

(Irene, Focus group interview)

“Using it (Wiki) in the class is something new to me and I find it exciting and easy for me to communicate with my lecturer and peers”

(Eli, Open-ended survey)

Excitement and interest from the students were good indicators when introducing a new technology in the classroom. Students also made favourable comments such as “new experience”, “never use before”, “interesting”, “curious”, and “exciting” in regards to the use of new technology in their lesson

Theme 4: challenges. Based on the analysis of the focus group interview and open-ended survey, there were a few challenges that were related to the use of Wiki for collaborative learning. Apart from the technological advantages, there were few issues concerning the features of Wiki. This may hinder students' excitement and initiative to use Wiki for their collaborative learning purposes. As these students commented in the focus group interview and open-ended survey:

> *"I don't like the lock/steal feature. It is a waste of time waiting for others to finish before I can start writing"*
>
> *(Mia, Focus group interview)*
>
> *"I cannot write in my group Wiki when my friend is writing and I find it very troublesome to wait"*
>
> *(Leena, Open-ended survey)*

The steal-lock feature in PBworks occurred when more than one users tried to work synchronously on the same Wiki page. This happened because of the characteristic of this particular Wiki, where it only allows users to work asynchronously instead of synchronously. This means that only one user is allowed to type and edit at a particular time, while others have to wait until the user has finished her writing. However, students can view what their friends are typing when the Wiki page is locked.

The steal-lock feature in PBworks clearly caused some issues with the students because they find this matter as a troublesome and a waste of time. Some comments made by the students which were related to the steal and lock issue were "waste of time", "must wait", "bored of waiting", and "troublesome".

Apart from the steal-lock issue in the class Wiki, some technical constraints were also expressed by a majority of participants. One of the technical issues mentioned was the slow upload time, which was mainly due to the poor Internet connection. This was found to be a major issue, especially when students are outside of the class and they need to work on their assignments in the class Wiki. As these students commented during the focus-group interview:

"It is too difficult for me to get in Wiki and post something when the Internet is too slow"

(Jane, Focus group interview)

"My hostel Internet is very slow, so I gave up doing work there. I must wait until class time so I can do it in the faculty"

(Nur, Focus group interview)

The issue of poor Internet connection can be seen by the students' comments such as "slow Internet", "no connection" and "not stable". This resulted in the lack of participation in the class Wiki by a few students. As one of the students commented in the open-ended survey:

"Slow Internet is the reason I participate less in Wiki"

(Aida, Open-ended survey)

The limitations on access to the Internet due to Wiki's requirement to have a good and stable Internet access for it to work was one of the reasons some students did not write directly on the Wiki page. Instead of writing directly in their group's Wiki page, the students preferred to compile it in Microsoft Word and paste the text later in class Wiki to avoid any glitches that could cause them to lose their work.

Another reason mentioned was the limitation of the file size in uploading the assessments given. Wiki has the limitation on the file capacity that could be uploaded, where it only allows small file size to be added to the Wiki page. Therefore, larger files such as videos cannot be uploaded directly into the Wiki page. However, it has to be uploaded via a different software or tool, where only the link can be added to the class Wiki. As one student commented during the focus group interview session:

> *"I really hope the Wiki could allow the students to post videos which have larger capacities without having them to be uploaded the video on YouTube first, then post the link on Wiki. I have to do double work"*
>
> *(Mike, Focus group interview)*

Another issue pertaining the Wiki usage for collaborative learning was the distraction from using Wiki during classroom session. As commented by the students from the focus group interview and open-ended survey:

> *"There are too many things going on and too many group Wikis. Most of them discussed the same thing and I ended up not looking at other group work to avoid losing focus"*
>
> *(Leanne, Focus group interview)*

Similar comment was also made by a student in the open-ended survey where she stated that:

> *"When I open Wiki I need to open the browser so I tend to browse other websites and got distracted from my work"*
>
> *(Ida, Open-ended survey)*

In addition, students made some comments such as “too many things going on”, “so many groups”, and “browse other websites”, indicating that they were distracted when using Wiki during their learning session.

Results and data analysis for Research Question 2. The second research question that this research aimed to answer was as follows:

What is the relationship between the determinants (attitude, social influence, and perceived behavioural control) and students’ behavioural intention towards the use of Wiki?

The second research question was analyzed using inferential statistics, namely the Pearson product-moment correlation analysis, in order to find the relationship between the factors that influence students’ intention to use Wiki. According to Creswell (2008), correlation is a statistical method used to determine whether two or more variables are related, and whether it influences each other.

Correlation coefficients provide the indication of the direction and strength of the association between two variables. The strength of the relationship between variables was based on the estimation of effect size by Cohen (1988) and can be seen in Table 4.15 below.

Table 4.15

The interpretation of the effect size of a correlation coefficient

Size of Correlation	Interpretation
0.10	Weak or small correlation
0.30	Moderate correlation
0.50	Strong or large correlation

Note. Reprinted from *Statistical power analysis for the behavioural sciences*, by J. Cohen, 1988, Hillsdale, NJ: Erlbaum Associates. Copyright 1988 by Erlbaum Associates.

Preliminary analyses: testing for normality. Prior to analyzing the correlational analysis, the survey data were tested for normality. The normality test was conducted to check whether the data obtained is normally distributed or not. Normal distribution means it has a symmetrical, bell-shaped curved, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes (Gravetter & Wallnau, 2000, as cited in Pallant, 2005).

Normality of data can be tested using statistical methods (Kolmogorov-Smirnov and Shapiro Wilks tests, or skewness and kurtosis) and graphs (histogram, stem-and-leaf plot, normal probability plot, or boxplot) (Chua Yan Piaw, 2013). For this study, the normality tests were presented statistically using skewness and kurtosis, as well as using histogram and the normal probability plot.

Skewness and kurtosis. Skewness assesses the extent to which a variable's distribution is symmetrical, or skewed (towards left or right tail) of the distribution. Values greater than +1 or lower than -1 indicates a substantially skewed distribution (Hair et al., 2014). A skewed distribution can either be positively skewed, where the frequent scores are clustered at the lower end and the tail points towards the higher or more positive scores, or negatively skewed, where the frequent scores are clustered at the higher end and the tail points towards the lower or more negative scores (Field, 2005).

On the other hand, kurtosis measures whether the distribution is too peaked, with a very narrow distribution with most of the responses in the centre (Hair et al., 2014). Chua Yan Piaw (2013) recommended the values of kurtosis to be between -1.96 to +1.96 for the data to be normally distributed.

Table 4.16 below summarizes the results for skewness and kurtosis. Based on the result, it can be seen that the skewness values for the research measurement items ranged from -0.474 (INT) to 0.312 (SI), which is within the recommended range of -1 to +1.

In addition, the kurtosis values ranged from -0.667(INT) to 0.120 (PU), which is within the recommended range of -1.96 to +1.96. Therefore, the data distribution were normal.

Table 4.16

Skewness and kurtosis values for the research measurement items

	Skewness	Kurtosis
Perceived Usefulness (PU)	-0.029	0.120
Ease of Use (EU)	-0.013	-0.095
Compatibility (COMP)	-0.049	0.068
Attitude (ATT)	0.131	-0.155
Peer Influence (PI)	0.309	-0.281
Lecturer Influence (LI)	0.141	0.072
Social Influence (SI)	0.312	-0.401
Self-Efficacy (SE)	0.178	-0.180
Technology Facilitating Condition (TFC)	0.098	-0.372
Resource Facilitating Condition (RFC)	0.125	-0.394
Perceived Behavioural Control (PBC)	-0.370	-0.370
Behavioural Intention (INT)	-0.474	-0.667

Histogram and normal probability plots. Histogram is a graph which displays the actual shape of the data distribution. When a data is normally distributed, the histogram displays a high distribution in the middle and a low distribution at both the left and right ends (Chua Yan Piaw, 2013). From the inspection of the histogram, it can be seen that all data are normally distributed (refer Figure 4.9 to Figure 4.20).

Using the normal probability plot, or the normal Q-Q plot, the normality of data can also be examined. Normality of the data can be seen when the points lie in a reasonably straight diagonal line from bottom left to top right, which shows there is no major deviation from normality (Pallant, 2005). From the normal probability plot test results, it can be seen that all data were normally distributed (refer Figure 4.9 to Figure 4.20).

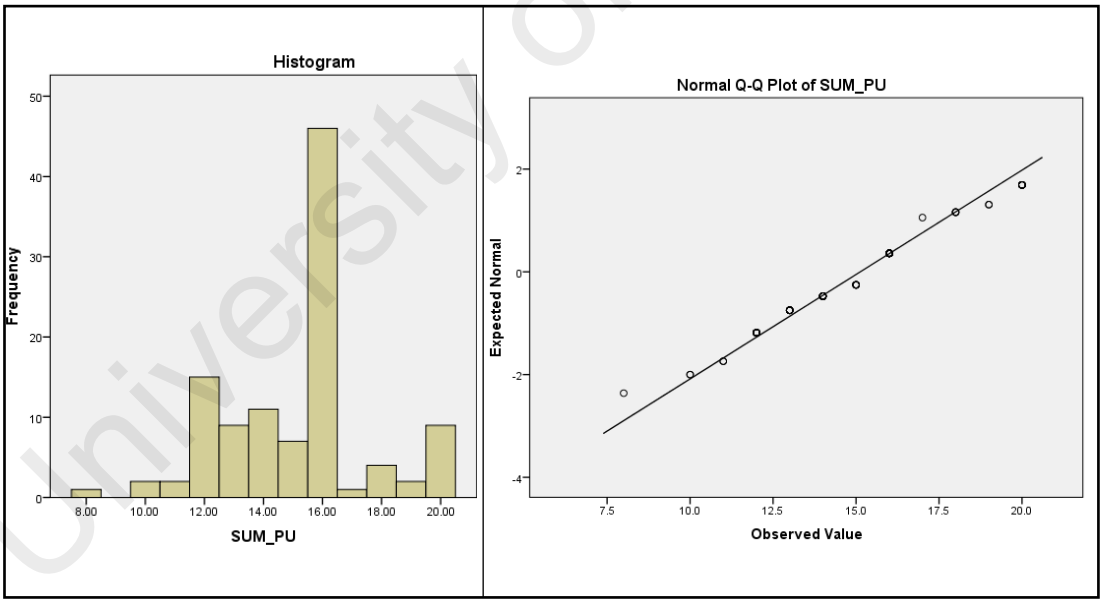

Figure 4.9. Histogram (on the left) and normal probability plot (on the right) for the variable perceived usefulness (PU)

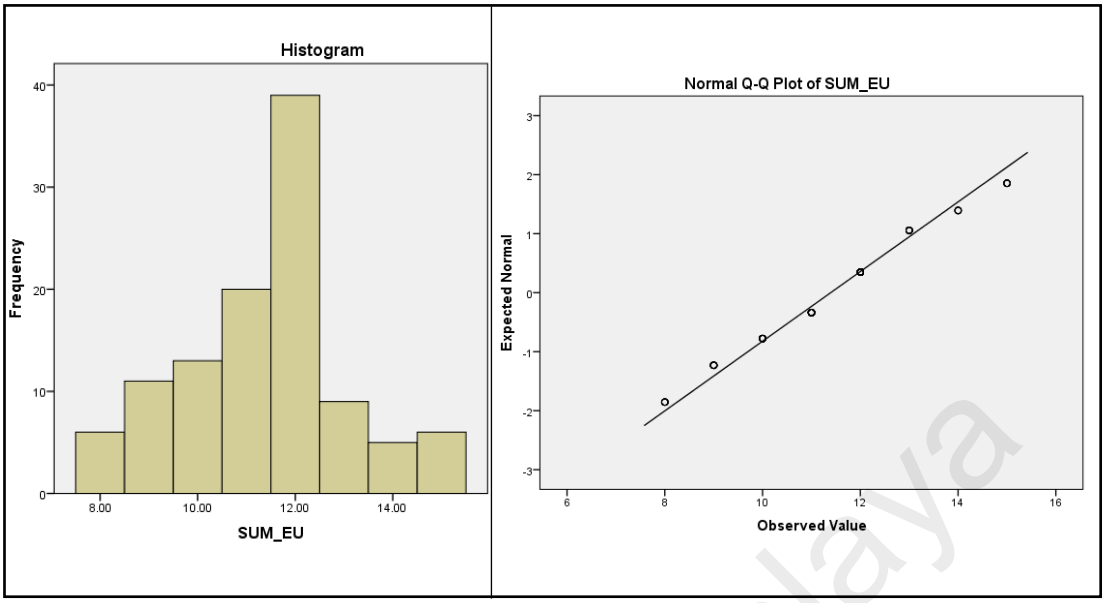

Figure 4.10. Histogram (on the left) and normal probability plot (on the right) for the variable ease of use (EU)

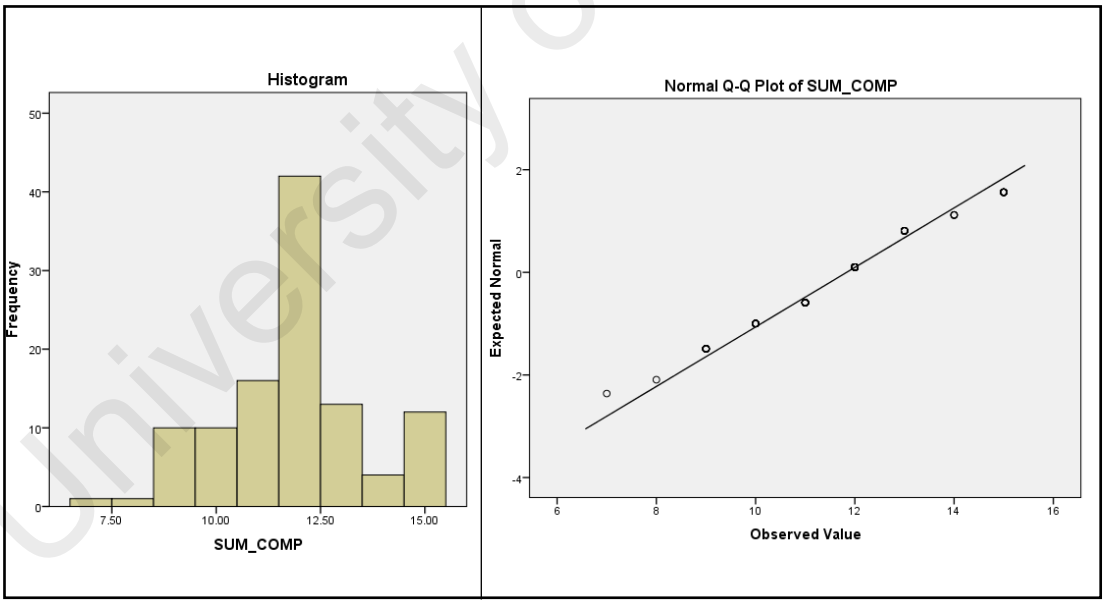

Figure 4.11. Histogram (on the left) and normal probability plot (on the right) for the variable compatibility (COMP)

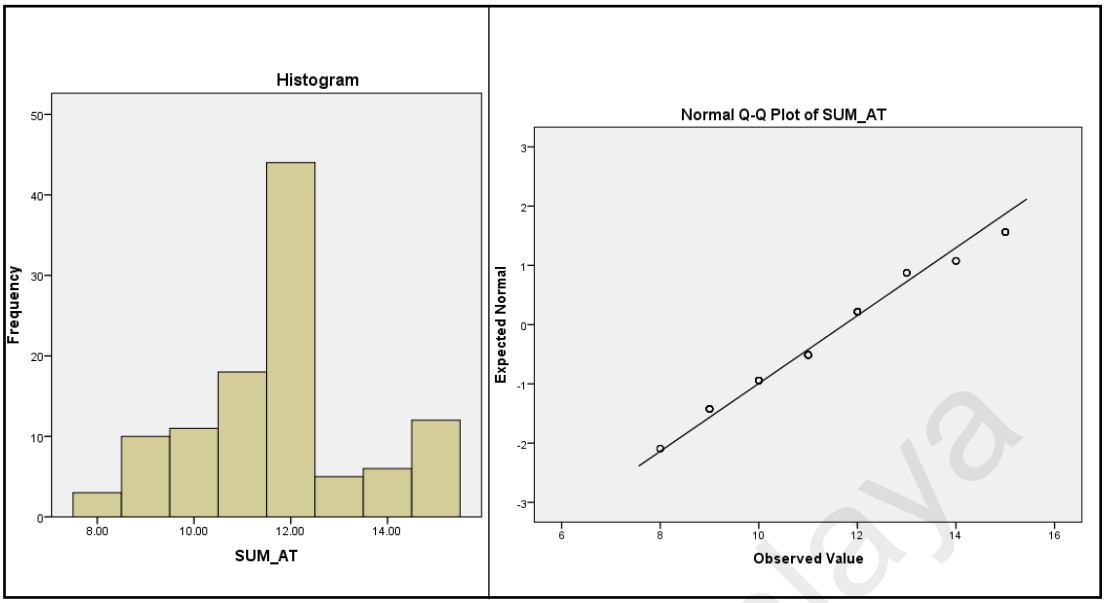

Figure 4.12. Histogram (on the left) and normal probability plot (on the right) for the variable attitude (ATT)

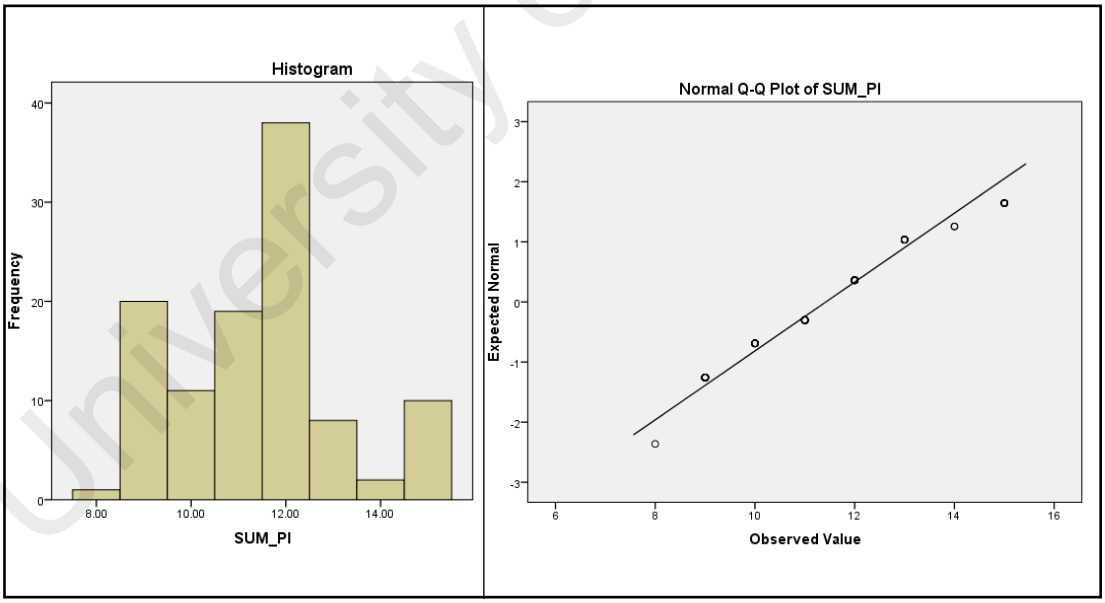

Figure 4.13. Histogram (on the left) and normal probability plot (on the right) for the variable peer influence (PI)

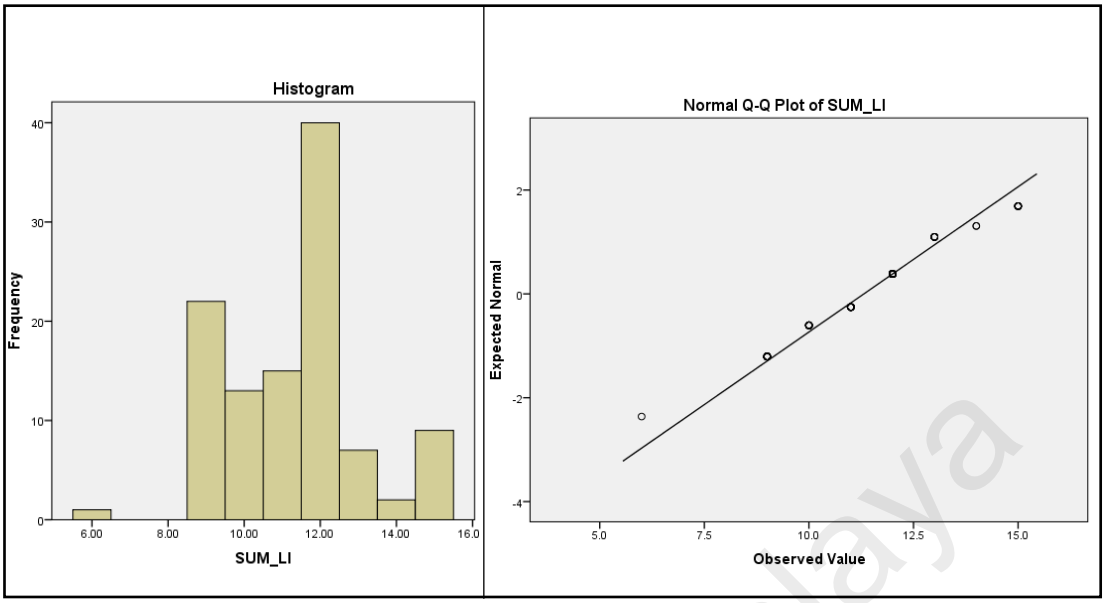

Figure 4.14. Histogram (on the left) and normal probability plot (on the right) for the variable lecturer influence (LI)

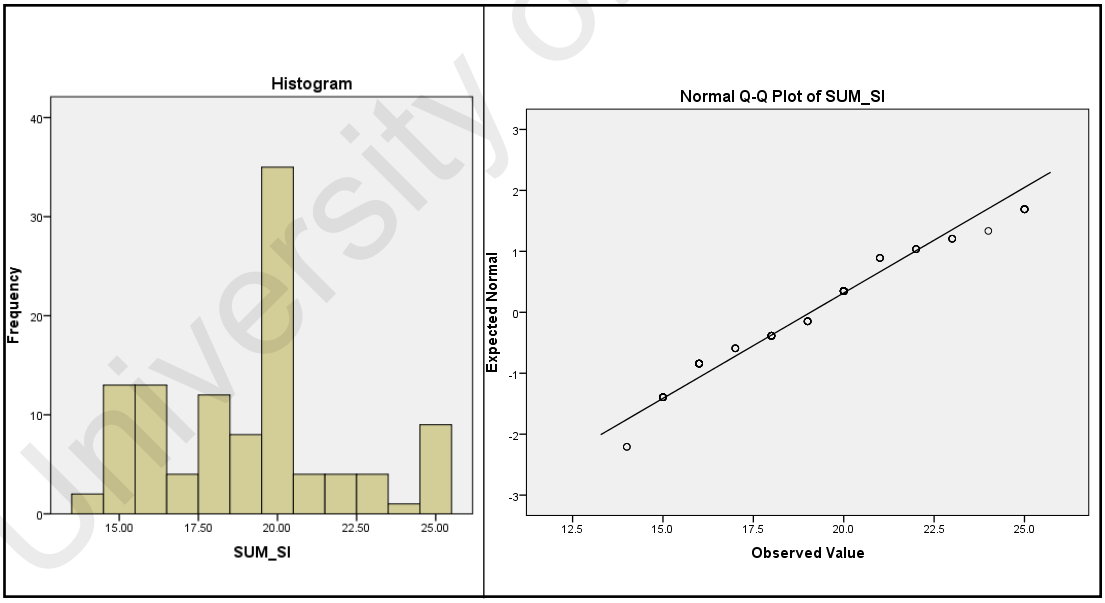

Figure 4.15. Histogram (on the left) and normal probability plot (on the right) for the variable social influence (SI)

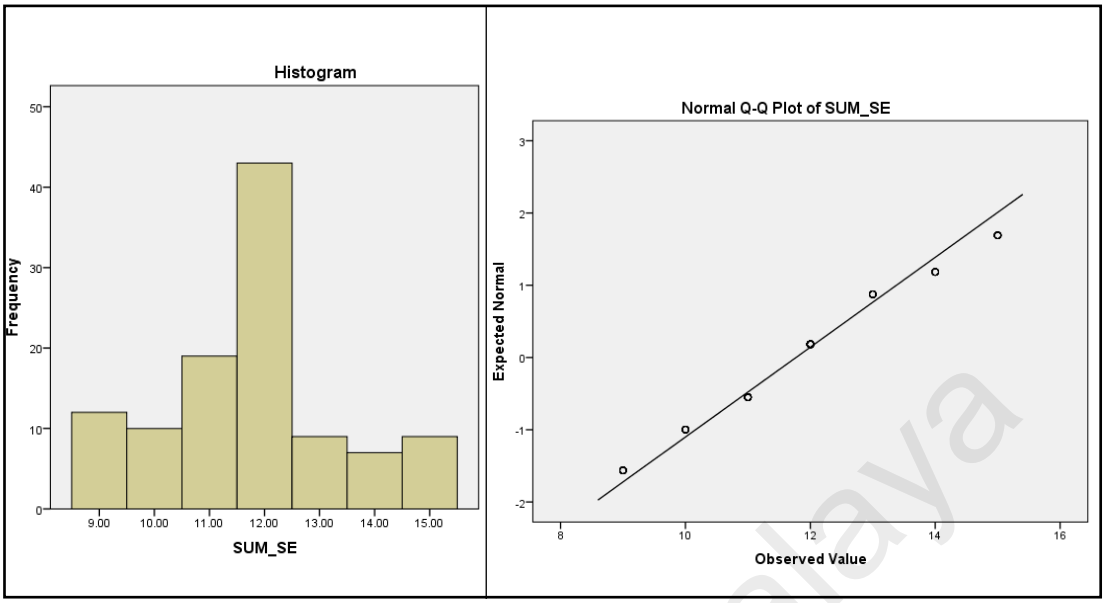

Figure 4.16. Histogram (on the left) and normal probability plot (on the right) for the variable self-efficacy (SE)

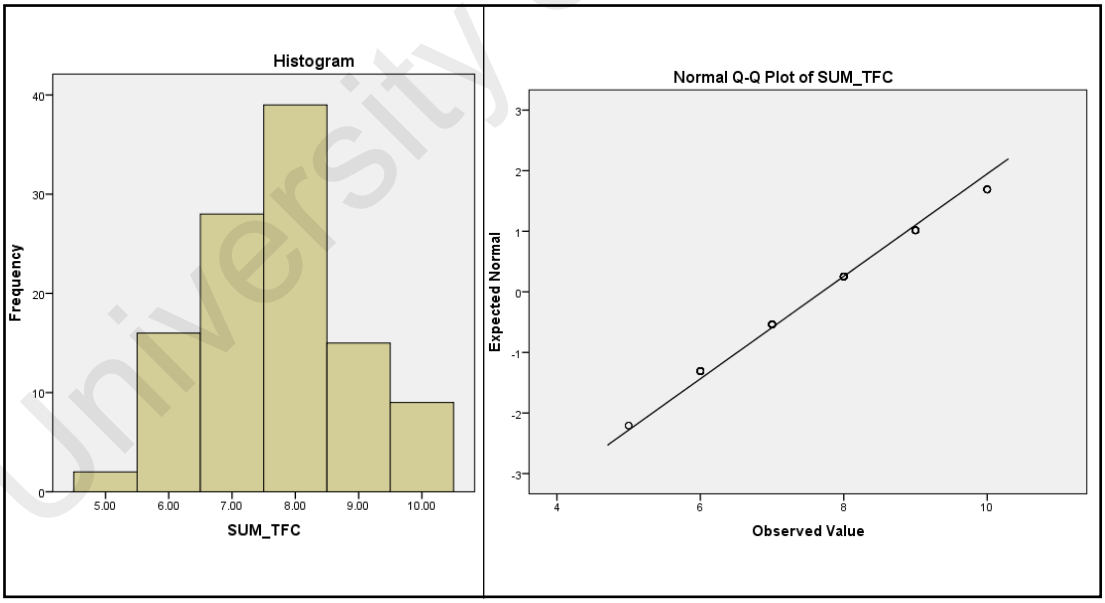

Figure 4.17. Histogram (on the left) and normal probability plot (on the right) for the variable technology facilitating condition (TFC)

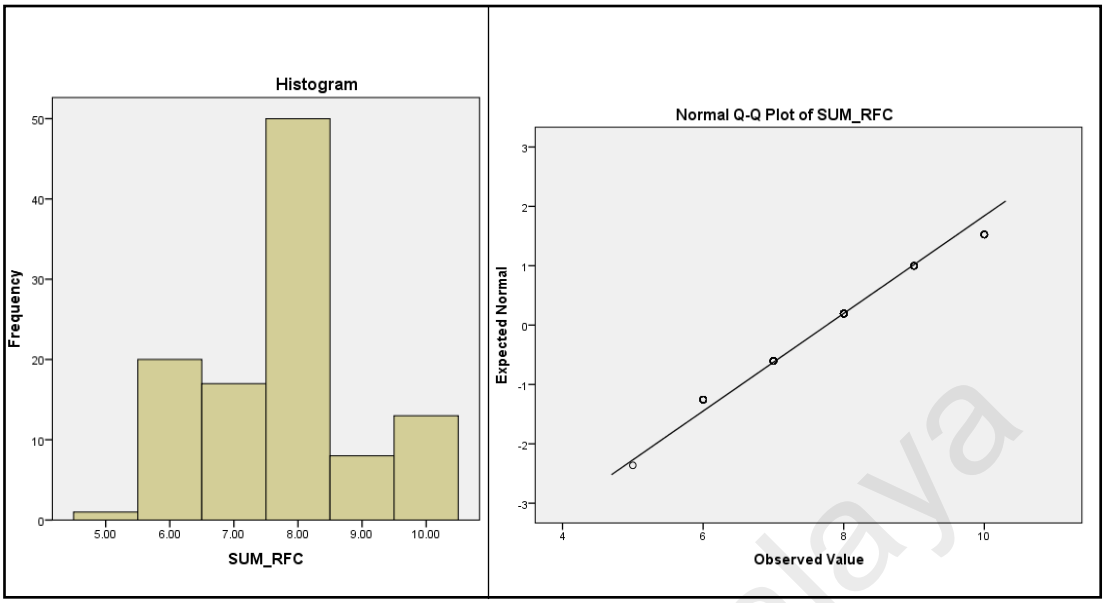

Figure 4.18. Histogram (on the left) and normal probability plot (on the right) for the variable resource facilitating condition (RFC)

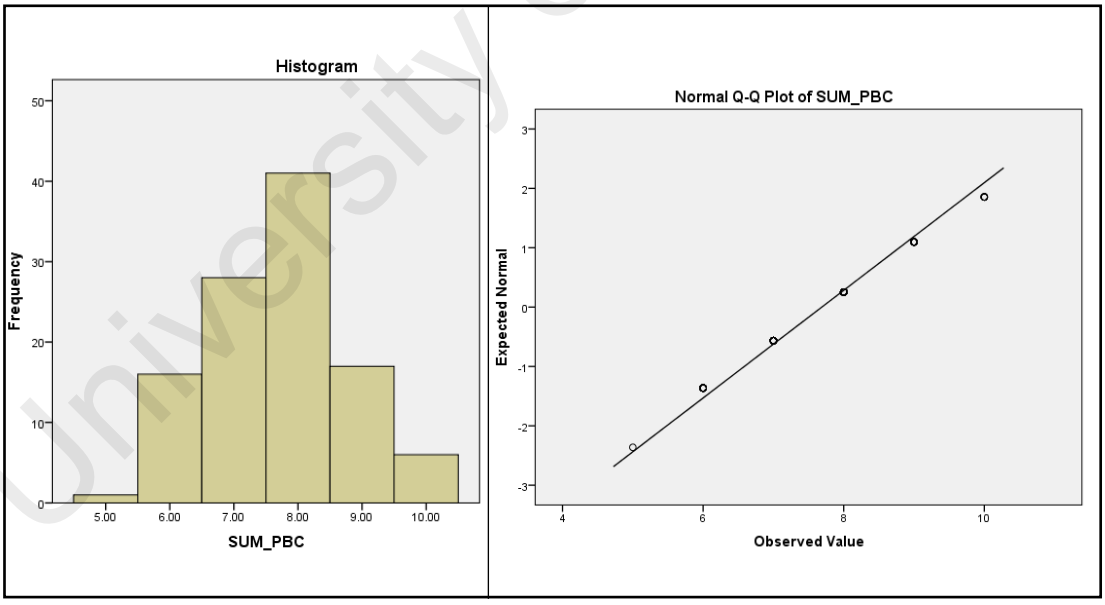

Figure 4.19. Histogram (on the left) and normal probability plot (on the right) for the variable perceived behavioural control (PBC)

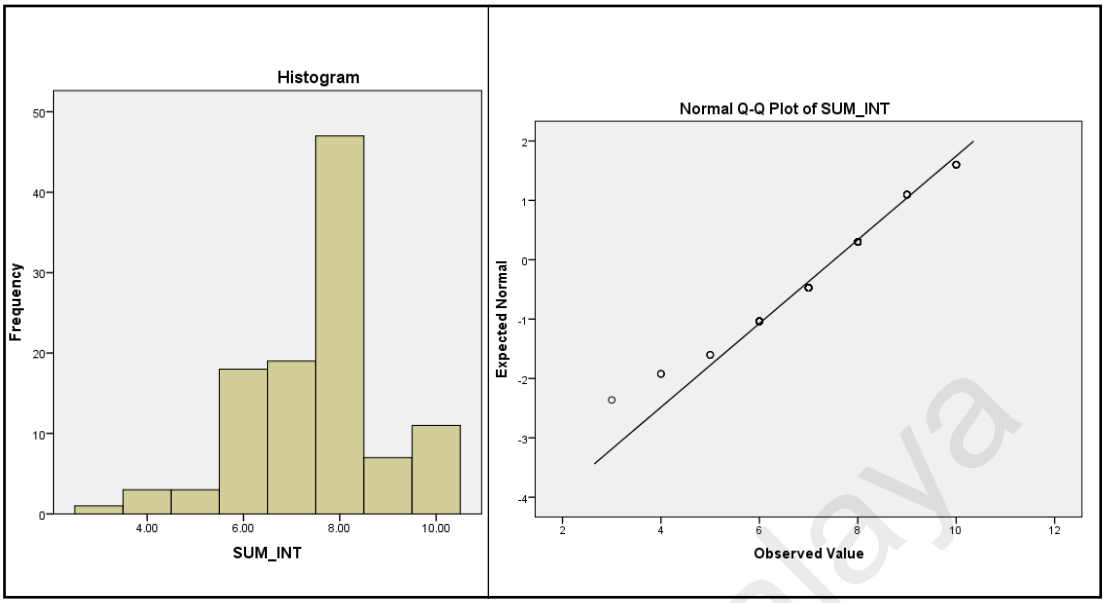

Figure 4.20. Histogram (on the left) and normal probability plot (on the right) for the variable behavioural intention (INT)

Prior to answering the second research question (Research Question 2), the three sub-questions, which were Research Question 2(a), Research Question 2(b), and Research Question 2(c) were analyzed beforehand.

Research Question 2(a). The Research Question 2(a) that this sub-section aimed to answer was as follows:

What is the relationship between attitude and behavioural intention towards the use of Wiki?

This section tested the relationship between the three (3) factors, which are: (1) perceived usefulness, (PU); (2) ease of use, (EU); and (3) compatibility, (COMP), with students' attitude (ATT) when using Wiki for collaboration purposes. The process involved testing three (3) research hypotheses, which were $H1_1$, $H1_2$, and $H1_3$.

Next, after the three relationships (H_{1_1}, H_{1_2}, and H_{1_3}) has been tested, the relationship between attitude (ATT) and behavioural intention (INT) towards the use of Wiki were analyzed. This process involved testing the fourth research hypothesis, which was H_{1_4}.

Testing the relationship between perceived usefulness and students' attitude when using Wiki (Research Hypothesis 1).

H_{1_1} There is a positive relationship between perceived usefulness and students' attitude when using Wiki.

H_{0_1} There is no relationship between perceived usefulness and students' attitude when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between perceived usefulness (PU) and students' attitude (ATT) when using Wiki for collaboration purposes. The result is shown in Table 4.17 below.

Referring to Table 4.17 below, there was a strong positive correlation between perceived usefulness and students' attitude when using Wiki, where r (109) = 0.728, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between perceived usefulness (PU) and students' attitude (ATT) when using Wiki for collaboration.

Table 4.17

Correlation between perceived usefulness (PU) and students' attitude (ATT) when using Wiki for collaboration purposes (n=109)

	Perceived Usefulness (PU)		Attitude (ATT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	15.13	2.46	11.73	1.74	0.728	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between ease of use and students' attitude when using Wiki (Research Hypothesis 2).

H_{1_2} There is a positive relationship between ease of use and students' attitude when using Wiki.

H_{0_2} There is no relationship between ease of use and students' attitude when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between ease of use (EU) and students' attitude (ATT) when using Wiki for collaboration purposes. The result is shown in Table 4.18 below.

Referring to Table 4.18 below, there was a strong positive correlation between ease of use (EU) and students' attitude (ATT) when using Wiki, where r (109) = 0.677, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between ease of use and students' attitude when using Wiki for collaboration.

Table 4.18

Correlation between ease of use (EU) and students' attitude (ATT) when using Wiki for collaboration purposes (n=109)

	Ease of Use (EU)		Attitude (ATT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.39	1.69	11.73	1.75	0.677	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between compatibility and students' attitude when using Wiki (Research Hypothesis 3).

H_{1_3} There is a positive relationship between compatibility and students' attitude when using Wiki.

H_{0_3} There is no relationship between compatibility and students' attitude when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between compatibility (COMP) and students' attitude (ATT) when using Wiki for collaboration purposes. The result is shown in Table 4.19 below.

Referring to Table 4.19 below, there was a strong positive correlation between compatibility (COMP) and students' attitude (ATT) when using Wiki, where r (109) = 0.690, $p<0.01$. Therefore, the null hypothesis is rejected. There is a significant positive relationship between compatibility (COMP) and students' attitude (ATT) when using Wiki for collaboration.

Table 4.19

Correlation between compatibility (COMP) and students' attitude (ATT) when using Wiki for collaboration purposes (n=109)

	Compatibility (COMP)		Attitude (ATT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.83	1.72	11.73	1.75	0.690	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between attitude and behavioural Intention towards the use of Wiki (Research Hypothesis 4).

H_{1_4} There is a positive relationship between attitude and behavioural intention when using Wiki for collaboration.

H_{0_4} There is no relationship between attitude and behavioural intention when using Wiki for collaboration.

Next, after the relationship between the three (3) factors, which are: (1) perceived usefulness (PU); (2) ease of use (EU); and (3) compatibility (COMP), with students' attitude (ATT) when using Wiki has been tested, the relationship between attitude (ATT) and behavioural intention (INT) towards the use of Wiki for collaboration purposes were then be tested. Pearson product-moment correlation coefficient was computed to assess the relationship between attitude (ATT) and behavioural intention (INT) when using Wiki for collaboration purposes.

The result for the correlation between students' attitude (ATT) and behavioural intention (INT) are shown in Table 4.20 below. Referring to Table 4.20 below, there was a strong positive correlation between attitude and behavioural intention, where $r(109) = 0.793$, $p<0.01$. Therefore, the null hypothesis is rejected. There is a significant

positive relationship between attitude (ATT) and behavioural intention (INT) when using Wiki for collaboration.

Table 4.20

Correlation between attitude (ATT) and behavioural intention (INT) when using Wiki for collaboration purposes (n=109)

	Attitude (ATT)		Behavioural Intention (INT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.73	1.75	7.53	1.42	0.793	0.00

Note. ** Correlation is significant at the 0.01 level

Research Question 2(b). The Research Question 2(b) that this sub-section aimed to answer was as follows:

What is the relationship between social influence and behavioural intention towards the use of Wiki?

This section tested the relationship between the two (2) factors, which are peer influence (PI) and lecturer influence (LI), with social influence (SI) when using Wiki for collaboration purposes. The process involved testing two (2) research hypotheses, which were H_{1_5}, and H_{1_6}.

Next, after the two relationships has been tested, the relationship between social influence (SI) and behavioural intention (INT) towards the use of Wiki for collaboration purposes were then analyzed. This process involves testing the seventh research hypothesis, which was H_{1_7}.

Testing the relationship between peer influence and social influence when using Wiki (Research Hypothesis 5).

H_{1_5} There is a positive relationship between peer influence and social influence when using Wiki.

H_{0_5} There is no relationship between peer influence and social influence when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between peer influence (PI) and social influence (SI) when using Wiki for collaboration purposes. The result is shown in Table 4.21 below.

Referring to Table 4.21 below, there was a strong positive correlation between peer influence (PI) and social influence (SI) when using Wiki, where r (109) = 0.838, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between peer influence (PI) and social influence (SI) when using Wiki for collaboration.

Table 4.21

Correlation between peer influence (PI) and social influence (SI) when using Wiki for collaboration purposes (n=109)

	Peer Influence (PI)		Social Influence (SI)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.42	1.74	19.08	2.89	0.838	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between lecturer influence and social influence when using Wiki for collaboration (Research Hypothesis 6).

H_{1_6} There is a positive relationship between lecturer influence and social influence when using Wiki.

H_{0_6} There is no relationship between lecturer influence and social influence when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between lecturer influence (LI) and social influence (SI) when using Wiki for collaboration purposes. The result is shown in Table 4.22 below.

Referring to Table 4.22 below, there was a strong positive correlation between lecturer influence (LI) and social influence (SI) when using Wiki, where r (109) = 0.864, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between lecturer influence (LI) and social influence (SI) when using Wiki for collaboration.

Table 4.22

Correlation between lecturer influence (LI) and social influence (SI) when using Wiki for collaboration purposes (n=109)

	Lecturer Influence (LI)		Social Influence (SI)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.31	1.79	19.08	2.89	0.864	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between social influence and behavioural intention towards the use of Wiki (Research Hypothesis 7).

H_{1_7} There is a positive relationship between social influence and behavioural intention when using Wiki for collaboration.

H_{0_7} There is no relationship between social influence and behavioural intention when using Wiki for collaboration.

Next, after the relationship between the two (2) factors, which are peer influence (PI) and lecturer influence (LI), with social influence (SI) has been tested, the relationship between social influence (SI) and behavioural intention (INT) towards the use of Wiki for collaboration purposes were then tested.

Pearson product-moment correlation coefficient was computed to assess the relationship between social influence (SI) and behavioural intention (INT) when using Wiki for collaboration purposes. The result is shown in Table 4.23 below.

Referring to Table 4.23 below, it was found that there was a strong positive correlation between social influence (SI) and behavioural intention (INT), where r (109) = 0.775, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between social influence (SI) and behavioural intention (INT) when using Wiki for collaboration.

Table 4.23

Correlation between social influence (SI) and behavioural intention (INT) when using Wiki for collaboration purposes (n=109)

	Social Influence (SI)		Behavioural Intention (INT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	19.08	2.89	7.52	1.42	0.775	0.00

Note. ** Correlation is significant at the 0.01 level

Research Question 2(c). The Research Question 2(c) that this sub-section aimed to answer was as follows:

What is the relationship between perceived behavioural control and behavioural intention towards the use of Wiki?

This section tested the relationship between the three (3) factors, which are: (1) self-efficacy (SE); (2) technology facilitating condition (TFC); and (3) resource facilitating condition (RFC), with perceived behavioural control (PBC) when using Wiki for collaboration purposes. The process involved testing three (3) research hypotheses, which were H_{1_8}, H_{1_9}, and $H_{1_{10}}$.

Next, after the three relationships has been tested, the relationship between perceived behavioural control (PBC) and behavioural intention (INT) towards the use of Wiki were then analyzed. This process involved testing the eleventh research hypothesis, which was $H_{1_{11.}}$

Testing the relationship between self-efficacy and perceived behavioural control when using Wiki (Research Hypothesis 8).

H_{1_8} There is a positive relationship between self-efficacy and perceived behavioural control when using Wiki.

H_{0_8} There is no relationship between self-efficacy and perceived behavioural control when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between self-efficacy (SE) and perceived behavioural control (PBC) when using Wiki for collaboration purposes. The result is shown in Table 4.24 below.

Referring to Table 4.24 below, there was a strong positive correlation between self-efficacy (SE) and perceived behavioural control (PBC) when using Wiki for collaboration purposes, where r (109) = 0.716, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between self-efficacy (SE) and perceived behavioural control (PBC) when using Wiki for collaboration.

Table 4.24

Correlation between self-efficacy (SE) and perceived behavioural control (PBC) when using Wiki for collaboration purposes (n=109)

	Self-Efficacy (*SE*)		Perceived Behavioural Control (*PBC*)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	11.77	1.61	7.69	1.10	0.716	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between technology facilitating condition and perceived behavioural control when using Wiki for collaboration (Research Hypothesis 9).

H_{1_9} There is a positive relationship between technology facilitating condition and perceived behavioural control when using Wiki

H_{0_9} There is no relationship between technology facilitating condition and perceived behavioural control when using Wiki

Pearson product-moment correlation coefficient was computed to assess the relationship between technology facilitating condition (TFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes. The result is shown in Table 4.25 below.

Referring to Table 4.25 below, there was a strong positive correlation between technology facilitating condition (TFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes, where r (109) = 0.616, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between technology facilitating condition (TFC) and perceived behavioural control (PBC) when using Wiki for collaboration.

Table 4.25

Correlation between technology facilitating condition (TFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes (n=109)

	Technology Facilitating Condition (TFC)		Perceived Behavioural Control (PBC)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	7.70	1.18	7.69	1.10	0.616	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between resource facilitating condition and perceived behavioural control when using Wiki for collaboration (Research Hypothesis 10).

$H1_{10}$ There is a positive relationship between resource facilitating condition and perceived behavioural control when using Wiki.

$H0_{10}$ There is no relationship between resource facilitating condition and perceived behavioural control when using Wiki.

Pearson product-moment correlation coefficient was computed to assess the relationship between resource facilitating condition (RFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes. The result is shown in Table 4.26 below.

Referring to Table 4.26 below, there was a strong positive correlation between resource facilitating condition (RFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes, where r (109) = 0.696, p<0.01. Therefore, the null hypothesis is rejected. There is a significant relationship between resource facilitating condition (RFC) and perceived behavioural control (PBC) when using Wiki for collaboration.

Table 4.26

Correlation between resource facilitating condition (RFC) and perceived behavioural control (PBC) when using Wiki for collaboration purposes (n=109)

	Resource Facilitating Condition (RFC)		Perceived Behavioural Control (PBC)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	7.76	1.22	7.69	1.10	0.696	0.00

Note. ** Correlation is significant at the 0.01 level

Testing the relationship between perceived behavioural control and behavioural intention towards the use of Wiki (Research Hypothesis 11).

$H1_{11}$ There is a positive relationship between perceived behavioural control and behavioural intention towards the use of Wiki.

$H0_{11}$ There is no relationship between perceived behavioural control and behavioural intention towards the use of Wiki.

Next, after the relationship between the three (3) factors, which are: (1) self-efficacy (SE); (2) technology facilitating condition (TFC); and (3) resource facilitating condition (RFC), with perceived behavioural control (PBC) has been tested, the relationship between perceived behavioural control (PBC) and behavioural intention

(INT) towards the use of Wiki for collaboration purposes were then tested. Pearson product-moment correlation coefficient was computed to assess the relationship between perceived behavioural control (PBC) and behavioural intention (INT) when using Wiki for collaboration purposes. The result is shown in Table 4.27 below.

Referring to Table 4.27 below, there was a strong positive correlation between perceived behavioural control (PBC) and behavioural intention (INT), where r (109) = 0.591, p<0.01. Therefore, the null hypothesis is rejected. There is a significant positive relationship between perceived behavioural control (PBC) and behavioural intention (INT) when using Wiki for collaboration.

Table 4.27

Correlation between perceived behavioural control (PBC) and behavioural intention (INT) when using Wiki for collaboration purposes (n=109)

	Perceived Behavioural Control (PBC)		Behavioural Intention (INT)			
n	Mean	Standard Deviation	Mean	Standard Deviation	*r*	*p*
109	7.69	1.10	7.52	1.42	0.591	0.00

Note. ** Correlation is significant at the 0.01 level

Summary of the hypotheses testing findings. Table 4.28 below summarized the findings of the hypotheses testing for this study.

Table 4.28

Summary of the hypotheses testing findings

Hypothesis	Findings	Rejected or Failed to Reject Null Hypothesis?
H_{1_1} There is a positive relationship between perceived usefulness and students' attitude when using Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_2} There is a positive relationship between ease of use and students' attitude when using Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_3} There is a positive relationship between compatibility and students' attitude when using Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_4} There is a positive relationship between attitude and behavioural intention towards the use of Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_5} There is a positive relationship between peer influence and social influence when using Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_6} There is a positive relationship between lecturer influence and social influence when using Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_7} There is a positive relationship between social influence and behavioural intention towards the use of Wiki.	Strong positive correlation	Null hypothesis is rejected
H_{1_8} There is a positive relationship between self-efficacy and perceived behavioural control when using Wiki.	Strong positive correlation	Null hypothesis is rejected

Table 4.28 continued

Hypothesis	Findings	Rejected or Failed to Reject Null Hypothesis?
H_{1_9} There is a positive relationship between technology facilitating condition and perceived behavioural control when using Wiki.	Strong positive correlation	Null hypothesis is rejected
$H_{1_{10}}$ There is a positive relationship between resource facilitating condition and perceived behavioural control when using Wiki.	Strong positive correlation	Null hypothesis is rejected
$H_{1_{11}}$ There is a positive relationship between perceived behavioural control and behavioural intention towards the use of Wiki.	Strong positive correlation	Null hypothesis is rejected

Results and data analysis for Research Question 3. The third research question that this research aimed to answer was as follows:

Which of the factors (attitude, social influence, and perceived behavioural control) best predict students' intention to adopt Wiki in the future?

In order to seek answer for the fourth research question, PLS-SEM method was applied and the data were analyzed using SmartPLS 3.0. PLS-SEM method focuses on the prediction of a specific set of hypothesized relationship that maximizes the explained variance in the dependent variables (Hair et al., 2014).

Therefore, PLS-SEM method is appropriate to be used when making prediction. This is because the third research question involved making prediction on the factors which best predict students' intention to adopt Wiki in the future for their teaching and learning purposes.

Prior to analysis, data were tested for normality to check whether data is normally distributed or not. Normal distribution means a symmetrical, bell-shaped curved, which has the greatest frequency of scores in the middle, with smaller frequencies towards the extremes (Gravetter & Wallnau, 2000, as cited in Pallant, 2005). Normality of data can be tested using statistical methods, such as the Kolmogorov-Smirnov and Shapiro Wilks tests, or skewness and kurtosis) and graphs (histogram, stem-and-leaf plot, normal probability plot, or boxplot) (Chua Yan Piaw, 2013).

Although PLS-SEM generally makes no assumptions about data distribution and does not require data to be normally distributed, however, it is considered worthwhile to check on data distribution (Hair et al., 2014). This is because extremely non-normal data are proved to be problematic in the assessment of the parameters' significance, thus decreasing the likelihood of some relationships that will be assessed as significant (Hair et al., 2014). Therefore, for this study normality testing were conducted in the earlier section to measure the normality of the distribution (see Figure 4.9 to Figure 4.20).

Six (6) stages of systematic procedures was applied when analyzing PLS-SEM method (Hair et al., 2014). The stages are shown in Figure 4.21 below.

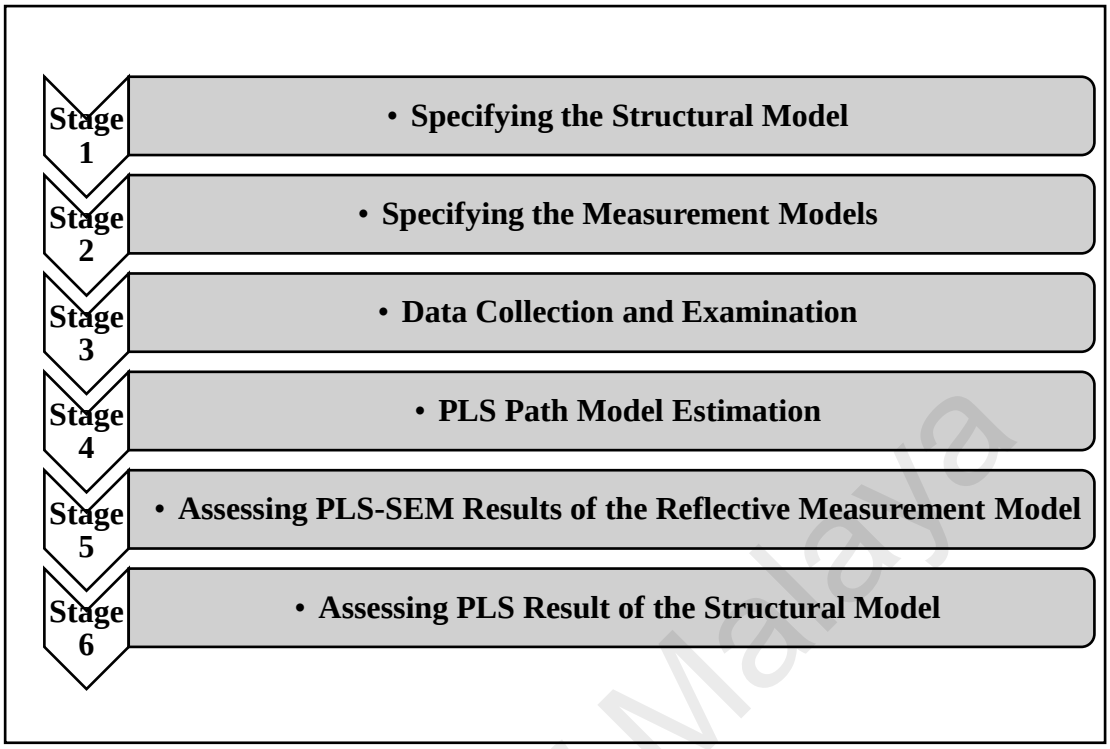

Figure 4.21. A systematic procedure for applying PLS-SEM. Adapted from *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (p. 169), by J. F. Hair, G. T. M. Hult, C. Ringle and M. Sarstedt, 2014, Thousand Oaks, California: Sage Publications. Copyright 2014 by Sage Publications.

Stage 1: specifying the Structural Model. The Structural Model are based on the research's conceptual framework, which was derived from the Decomposed Theory of Planned Behaviour (DTPB) model by Taylor and Todd (1995). The structural model, or also referred to as the inner model, is the relationship between constructs, or the latent variable.

Figure 4.22 below illustrates the constructs and their relationships which represented the Structural Model for this study. The model has two main conceptual components. The first component was the target constructs of interest, which were the

dependent variables, namely attitude (ATT), social influence (SI), perceived behavioural control (PBC), and behavioural intention (INT).

The second component was the independent variables that represent the key determinants of the target constructs, namely perceived usefulness (PU), ease of use (EU), compatibility (COMP), peer influence (PI), lecturer influence (LI), self-efficacy (SE), technology facilitating condition (TFC), and resource facilitating condition (RFC).

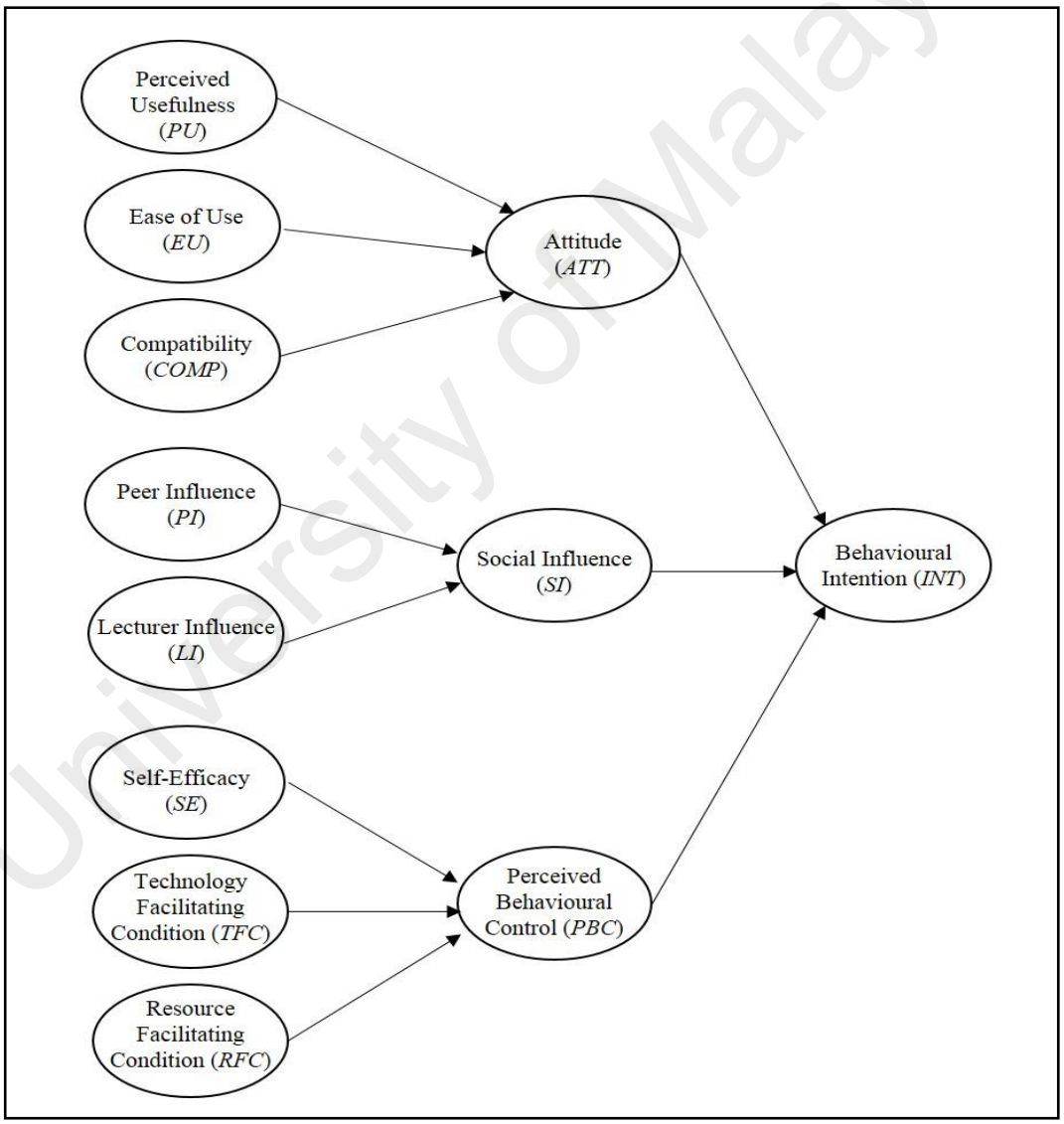

Figure 4.22. The constructs and its relationship which represented the research's Structural Model

Stage 2: specifying the Measurement Models. Measurement Model, or also referred as the Outer Model, shows the relationship between the constructs and the indicator variables. The measurement model for each construct or the latent variable for this study was as shown in Figure 4.23 and Figure 4.24 below.

Since the constructs are not directly observed, a Measurement Model for each construct need to be specified (Hair et al., 2014). This study employed the Reflective Measurement Model, where the construct is a trait which explains the indicators (observed variables) instead of a combination of the indicators (Fornell and Bookstein, 1982, as cited in Hair et al., 2014). Apart from that, the indicators, or the observed variables, represented the consequences of a construct instead of being the cause that made the construct (Rossiter, 2002, in Hair et al., 2014).

Based on the conceptual framework of this study, there were twelve (12) constructs, which were perceived usefulness (PU), ease of use (EU), compatibility (COMP), peer influence (PI), lecturer influence (LI), self-efficacy (SE), technology facilitating condition (TFC), resource facilitating condition (RFC), social influence (SI), perceived behavioural control (PBC), and behavioural intention (INT). All of these twelve (12) constructs were measured by multiple items.

All the constructs have reflective measurement models, which were indicated by the arrows pointing from the construct to the indicators (refer Figure 4.23). Reflective indicators can be viewed as a representative sample of all the possible items available within the conceptual domain of the construct (Hair et al., 2014). For example, the construct perceived usefulness (PU) is measured by means of the four (4) reflective items, which are PU_1, PU_2, PU_3, and PU_4.

Since a reflective measure dictates that all indicator items are caused by the same construct, therefore, indicators associated with a particular construct should be highly correlated with each other (Hair et al., 2014). All of the constructs and its reflective items were obtained from the research survey.

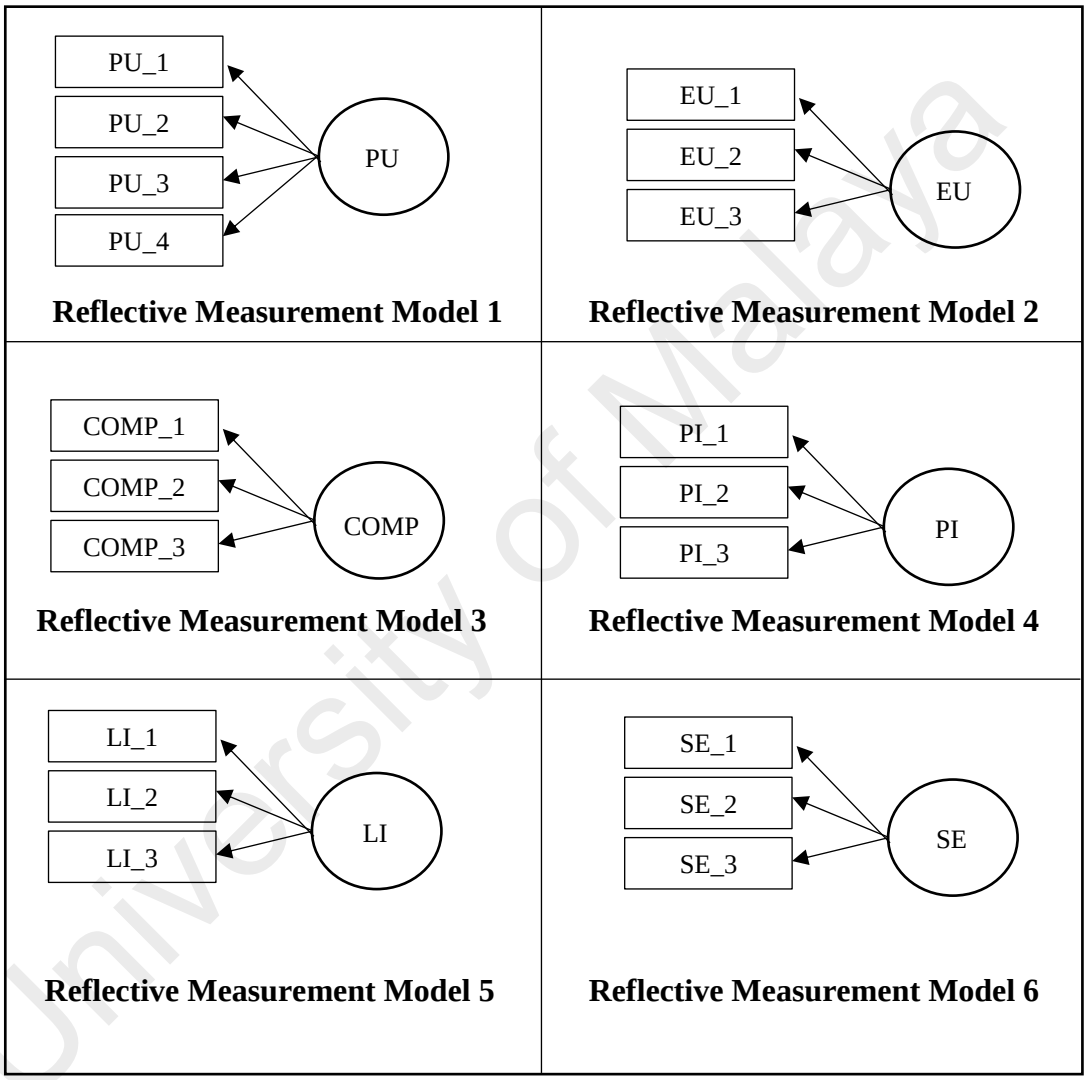

Figure 4.23. The indicators for each of the constructs in Reflective Measurement Model 1 until Reflective Measurement Model 6

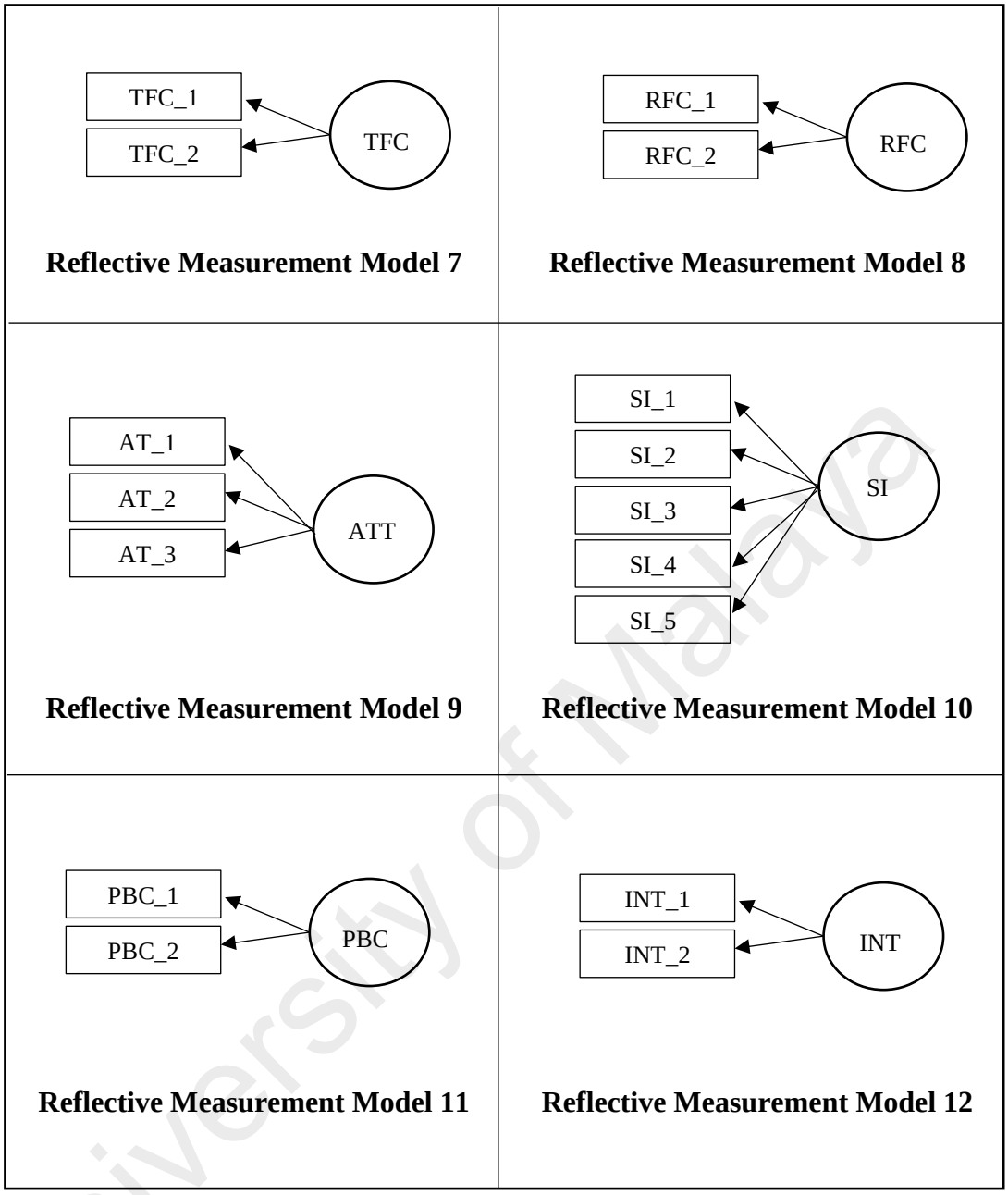

Figure 4.24. The indicators for each of the constructs in Reflective Measurement Model 7 until Reflective Measurement Model 12

Table 4.29 below shows the indicators for each of the constructs in the Reflective Measurement Model.

Table 4.29

The indicators for each of the constructs in the Reflective Measurement Model

Construct	Indicators	Number of Summated Scale
Ease of Use (EU)	EU_1, EU_2, EU_3	3
Perceived Usefulness (PU)	PU_1, PU_2, PU_3, PU_4	4
Compatibility (COMP)	COMP_1,COMP_2, COMP_3	3
Peer Influence (PI)	PI_1, PI_2, PI_3	3
Lecturer Influence (LI)	LI_1, LI_2, LI_3	3
Self-Efficacy (SE)	SE_1, SE_2, SE_3	3
Resources Facilitating Condition (RFC)	RFC_1, RFC_2	2
Technology Facilitating Condition (TFC)	TFC_1, TFC_2	2
Attitude (ATT)	AT_1, AT_2, AT_3	3
Social Influence (SI)	SI_1, SI_2, SI_3, SI_4, SI_5	5
Perceived Behavioural Control (PBC)	PBC_1, PBC_2	2
Behavioural Intention (INT)	INT_1, INT_2	2

The overall path model for this research was displayed in Figure 4.25 below. The diagram displays the connection between constructs and variables which were based on the research hypotheses presented earlier in this study.

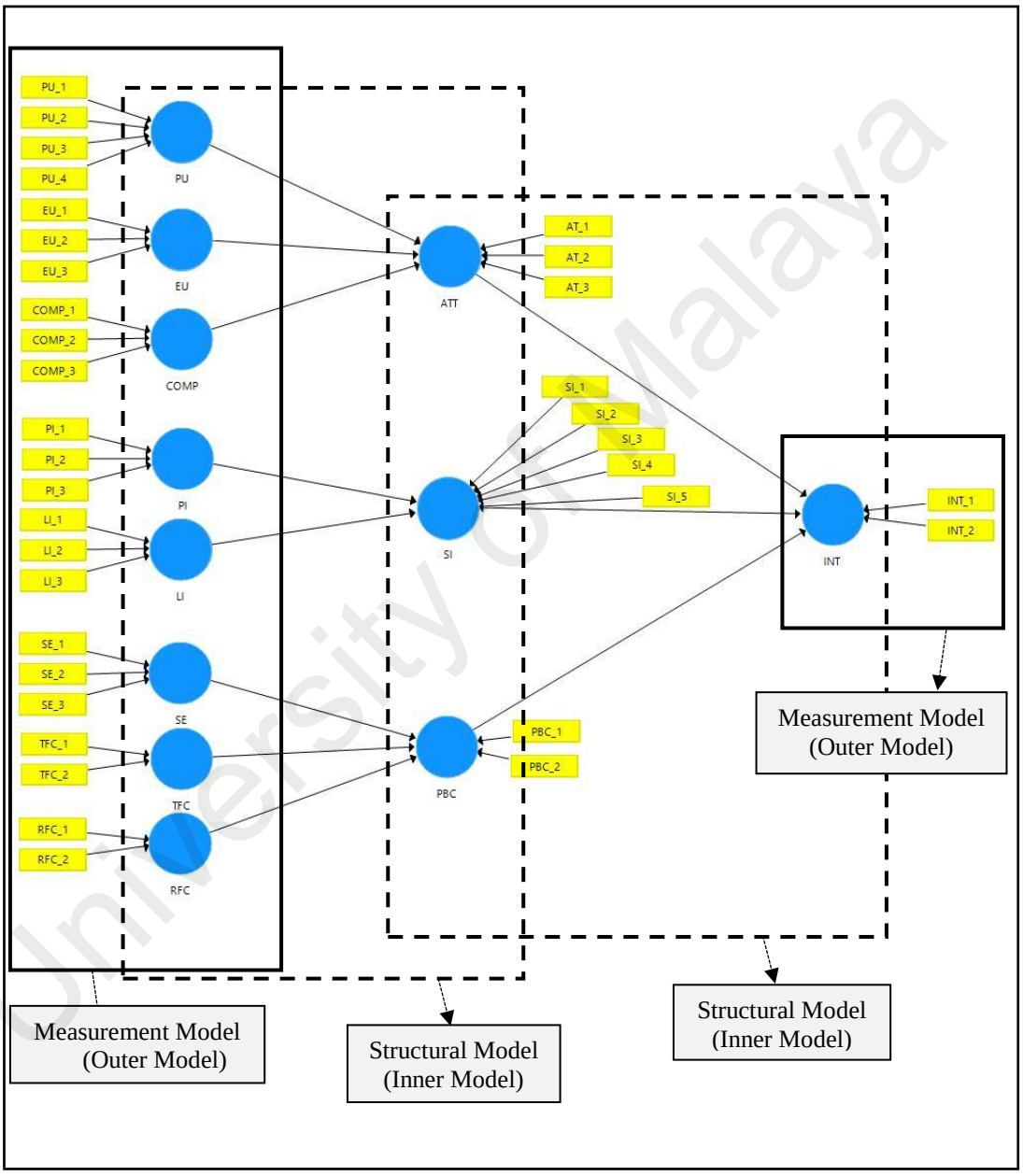

Figure 4.25. The research path model which displays the connection between the constructs and variables

The evaluation of the path model involved a two-step process (refer Figure 4.21). The first step was the evaluation of the Measurement Models, which was at Stage 5. The second step was the evaluation of the Structural Model, which was at Stage 6. The Measurement Model assessment allows the evaluation of the reliability and validity of the construct measures.

After the reliability and validity test has been measured and established, the structural model was then evaluated. The evaluation involved the process of testing the coefficients of determination (R^2 values) as well as the level and significance of the path coefficients (Hair et al., 2014).

Stage 3: data collection and examination. Prior to using the SmartPLS software 3.0, the collected data has been screened for any missing value, outlier, and normality using SPSS IBM Statistics. However, the normality of data is not an issue with PLS-SEM analysis method. PLS-SEM analysis does not require data to be normally distributed (Hair et al., 2014). However, it is important to verify that the data are not too far from normal as extremely non-normal data prove to be problematic in the assessment of the parameters' significances (Hair et al., 2014). Therefore, all data has been checked for normality issue during the earlier analysis and were found to be normally distributed.

Prior to calculating the PLS algorithm, the significance of the path model were checked using the bootstrapping procedure. During the bootstrapping procedure, a large number of sub-samples, which is also known as the bootstrap samples, were drawn from the original sample with replacement (Hair et al., 2014).

Replacement means that each time an observation was drawn randomly from the sampling population, it will then be returned to the sampling population before the next observation is drawn (Hair et al., 2014). The bootstrapping procedure was run using 500 bootstrap samples. The model is considered significant if the *p* value is less than 0.05, with 95% confidence interval.

Stage 4: PLS path model estimation. In Stage 4, which is the model estimation stage, the PLS algorithm was calculated. The PLS algorithm provided three (3) key results, which were : (1) the outer loadings for the measurement model; (2) the path coefficients for the structural model relationships; and (3) the R^2 values of the latent endogenous variables, which are attitude (ATT), social influence (SI), perceived behavioural control (PBC), and behavioural intention (INT) (Hair et al., 2014).

In this stage, the researcher was able to determine whether the conceptual model are validated empirically. Additionally, by examining the relative sizes of the significant path relationships, it is possible to make statements about the relative importance of the exogenous latent variables in predicting the endogenous latent variable (Hair et al., 2014). The result was explained in detail during the evaluation of the measurement models (Stage 5) and evaluation of the structural model (Stage 6).

Stage 5: assessing PLS-SEM results of the Reflective Measurement Models. Measurement model assessment involved the process of examining the reliability and validity of the construct measures. Four (4) measures were tested when assessing the reflective measurement models. They were:

i. internal consistency reliability using composite reliability (CR)

ii. individual indicator reliability;

iii. average variance extracted (AVE) to evaluate convergent validity; and

iv. Fornell-Larcker criterion and cross loadings to evaluate discriminant validity (Hair et al., 2014).

Table 4.30 below shows the summarized results of all four (4) reflective measurement model assessments. Details of each assessment and its results are presented in the next sub-sections.

Table 4.30

Reflective Measurement Model assessments result

Construct	Indicators	Outer Loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)
Perceived Usefulness (PU)	PU_1	0.866	0.741	0.920
	PU_2	0.908		
	PU_3	0.807		
	PU_4	0.860		
Ease of Use (EU)	EU_1	0.891	0.645	0.843
	EU_2	0.838		
	EU_3	0.663		
Compatibility (COMP)	COMP_1	0.854	0.743	0.897
	COMP_2	0.842		
	COMP_3	0.889		
Peer Influence (PI)	PI_1	0.868	0.708	0.879
	PI_2	0.867		
	PI_3	0.787		
Lecturer Influence (LI)	LI_1	0.849	0.724	0.887
	LI_2	0.902		
	LI_3	0.799		
Self-Efficacy (SE)	SE_1	0.906	0.717	0.884
	SE_2	0.833		
	SE_3	0.798		

Table 4.30 continued

Construct	Indicators	Outer Loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)
Self-Efficacy (SE)	SE_1	0.906	0.717	0.884
	SE_2	0.833		
	SE_3	0.798		
Resources Facilitating Condition (RFC)	RFC_1	0.875	0.787	0.881
	RFC_2	0.899		
Technology Facilitating Condition (TFC)	TFC_1	0.913	0.843	0.915
	TFC_2	0.923		
Attitude (ATT)	AT_1	0.910	0.688	0.867
	AT_2	0.697		
	AT_3	0.866		
Social Influence (SI)	SI_1	0.789	0.645	0.901
	SI_2	0.820		
	SI_3	0.852		
	SI_4	0.804		
	SI_5	0.748		
Perceived Behavioural Control (PBC)	PBC_1	0.801	0.620	0.765
	PBC_2	0.773		
Behavioural Intention (INT)	INT_1	0.916	0.833	0.909
	INT_2	0.910		

Internal consistency reliability using composite reliability (CR). Internal consistency reliability was used to evaluate the consistency of results across items on the same test. In PLS-SEM method, composite reliability (CR) testing was used instead of Cronbach's alpha.

Cronbach's alpha provides an estimate of the reliability based on the inter-correlations of the observed indicator variables and assumes that all indicators have equal outer loadings on the construct (Hair et al., 2014). On the other hand, composite reliability involved the measure of internal consistency reliability which does not

assume equal indicator loadings as PLS-SEM prioritizes the indicators according to their individual reliability (Hair et al., 2014).

The values for internal consistency reliability is between 0 and 1, where the higher the value indicates a higher level of validity. Hair et al. (2014) suggested that the values of composite reliability should be higher than 0.708. Composite reliability value below 0.60 indicates a lack of internal consistency reliability (Hair et al., 2014).

On the other hand, composite reliability values between 0.60 and 0.70 are acceptable in exploratory research (Nunally & Bernstein, 1994, as cited in Hair et al., 2014). Table 4.31 below displays the summary of the composite reliability values and its explanation.

Based on Table 4.31 below, the composite reliability values for all constructs ranged from 0.765 (perceived behavioural control, PBC) to 0.920 (perceived usefulness, PU), which exceeded the recommended value of 0.708. This indicated that the constructs were stable, equivalent, and have good internal consistency reliability.

Table 4.31

Summary of the composite reliability (CR) values

Composite Reliability Values	Explanation	Source
< 0.60	Lack of internal consistency reliability	(Hair et al., 2014)
0.60 – 0.70	Acceptable in exploratory research	(Nunally & Bernstein, 1994, in Hair et al., 2014)
> 0.708	Good internal consistency reliability	(Hair et al., 2014)

Indicator reliability using the outer loading values. Indicator reliability is shown by the construct's high outer loading values, which shows that the indicators have much in common. Hair et al. (2014) suggested that the outer loadings should be 0.708 or higher.

However, Hulland (1999) noted that studies in the field of social sciences often observes weaker outer loadings values, therefore rather than eliminating the indicators immediately, it is advised to carefully examine the effects of item removal on the composite reliability and construct's content validity (as cited in Hair et al., 2014).

Referring to Table 4.30 above, the outer loadings values of the indicators in this research were higher than 0.708, except for EU_3 (0.663) and AT_2 (0.697). Therefore, the outer loading relevance testing was conducted.

Based on the outer loading relevance testing technique proposed by Hair et al. (2014) which can be referred to in Figure 4.26 below, if the outer loading value is more than 0.40 but less than 0.70, it will be then considered for the analysis of the impact of the deletion of indicator to the average variance extracted (AVE) and composite reliability (CR) values.

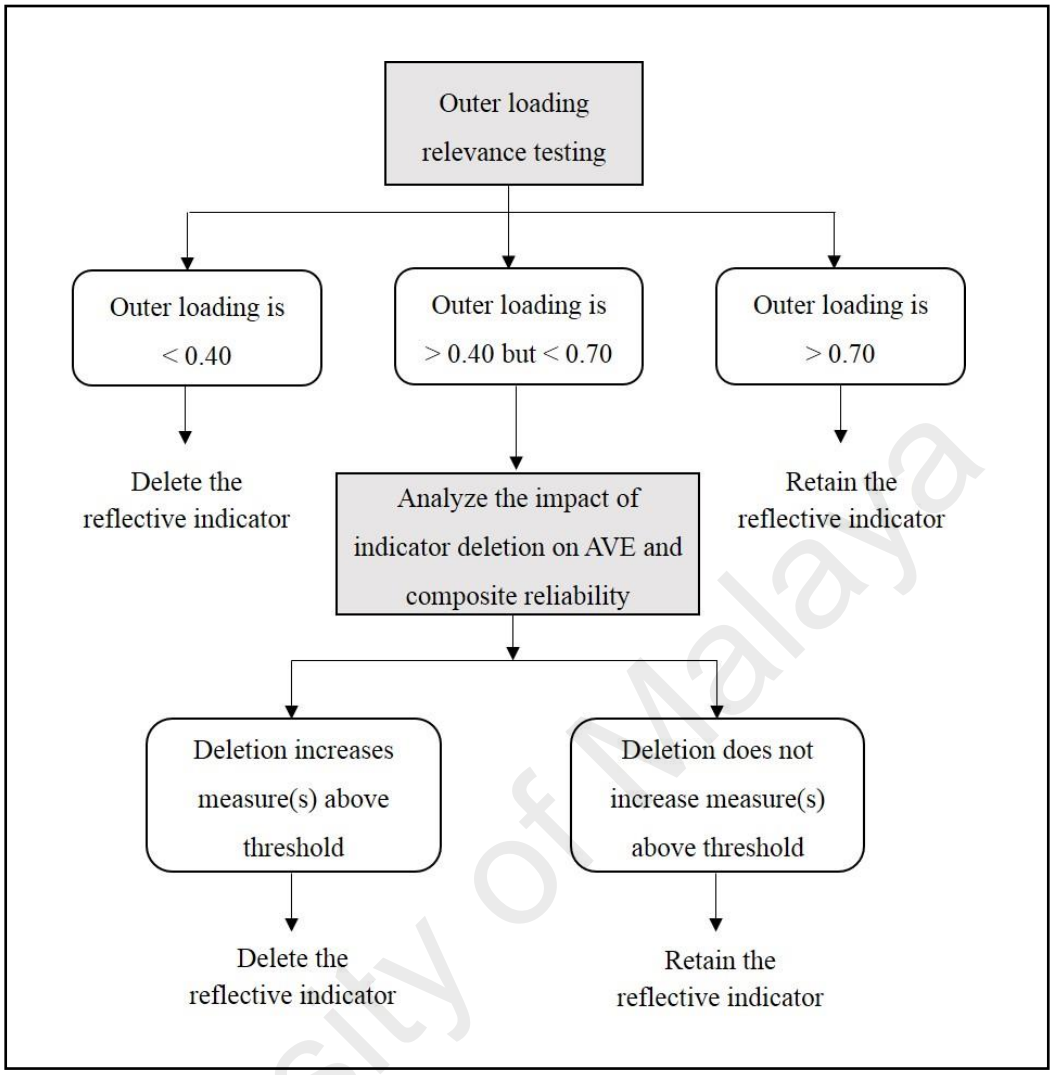

Figure 4.26. The outer loading relevance testing. Adapted from *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (p. 104), by J. F. Hair, G. T. M. Hult, C. Ringle, C. and M. Sarstedt, 2014, Thousand Oaks, California: Sage Publications. Copyright 2014 by Sage Publications.

Both indicators (EU_3 and AT_2) were deleted and path algorithm was re-calculated to analyze the impact of indicator deletion on average variance extracted (AVE) and composite reliability (CR) values. After the indicator EU_3 was deleted, the composite reliability (CR) value for EU was 0.839, while the average variance extracted (AVE) was 0.635.

The deletion did not increase the measure above the threshold value. Next, after the deletion of indicator AT_2, the composite reliability (CR) value for AT was 0.892, while the average variance extracted (AVE) was 0.670, which also did not increase the measure above the threshold value.

Since the deletion of both indicators (EU_3 and AT_2) did not increase the composite reliability (CR) and average variance extracted (AVE) values above the suggested threshold level, therefore both indicators were retained. The summary of outer loading relevance testing are displayed in Table 4.32 below.

Table 4.32

Summary of outer loading relevance testing for indicators (EU_3 and AT_2)

Indicators	Before deletion		After deletion		Decision
	Average Variance Extracted (AVE)	Composite Reliability (CR)	Average Variance Extracted (AVE)	Composite Reliability (CR)	
EU_3	EU : 0.645	EU: 0.843	EU: 0.635	EU: 0.839	Retain the indicator
AT_2	AT: 0.685	AT: 0.897	AT: 0.670	AT: 0.892	Retain the indicator

Convergent validity using outer loadings of the indicators and average variance extracted (AVE). Convergent validity relates to the extent in which a measure correlates positively with the alternative measures of the same construct (Hair et al., 2014). There were two aspects that need to be considered in establishing convergent validity; (1) the outer loadings of the indicators, which has already been explained previously; (2) average variance extracted (AVE).

Average variance extracted (AVE) can be defined as the grand mean value of the squared loadings, where the value should be more than 0.50 (Hair et al., 2014). Based on Table 4.30 presented earlier on the above sub-section, the average variance extracted (AVE) values for all constructs exceeded the 0.50 threshold. This showed that the construct explained more than half of the variance of its indicators. Therefore, convergent validity has been established.

Discriminant validity using the examination of cross loadings and the Fornell-Larcker criterion. Discriminant validity is the extent in which a construct truly distinct from other constructs by empirical standards (Hair et al., 2014). This means that the construct uniquely measure the phenomenon that it intends to measure in which other constructs do not measure.

In this study, two methods were used to evaluate discriminant validity. They were: (1) the examination of cross loadings; or (2) the Fornell-Larcker criterion. This research applied both methods as a way to re-confirm the discriminant validity.

i. The examination of cross loadings

When using cross loadings, discriminant validity is established when an indicator's loading on a construct is higher than all of its cross loadings with other constructs (Hair et al., 2014). Table 4.33 below displays the outer loadings, and cross loadings for each of the indicators.

From Table 4.33, it can be seen that the outer loadings for every constructs were higher than all of the cross loadings with other constructs. For example, the indicator AT_1 has the highest value for the loading with its corresponding construct AT_1 (0.910), while all cross loadings with other constructs were considerably lower

(for example, AT_1 on COMP: 0.509). This was also true for other COMP indicators, and also other indicators that measure EU, INT, LI, PBC, PI, PU, RFC, SE, SI, and TFC. These results indicated that the discriminant validity has been established.

Table 4.33

Assessment of constructs' outer loadings and cross loadings

	ATT	COMP	EU	INT	LI	PBC	PI	PU	RFC	SE	SI	TFC
AT_1	**0.910**	0.509	0.615	0.769	0.614	0.560	0.631	0.647	0.580	0.630	0.681	0.610
AT_2	**0.697**	0.745	0.449	0.473	0.452	0.542	0.495	0.469	0.439	0.459	0.510	0.473
AT_3	**0.866**	0.458	0.607	0.732	0.706	0.524	0.677	0.689	0.719	0.627	0.756	0.609
COMP_1	0.549	**0.854**	0.570	0.507	0.481	0.421	0.457	0.462	0.446	0.458	0.535	0.424
COMP_2	0.535	**0.842**	0.436	0.455	0.440	0.494	0.477	0.430	0.385	0.472	0.473	0.409
COMP_3	0.636	**0.889**	0.535	0.547	0.493	0.616	0.511	0.515	0.451	0.511	0.549	0.454
EU_1	0.579	0.459	**0.891**	0.608	0.704	0.516	0.563	0.703	0.685	0.658	0.701	0.600
EU_2	0.566	0.425	**0.838**	0.747	0.572	0.516	0.658	0.738	0.514	0.718	0.679	0.710
EU_3	0.481	0.572	**0.663**	0.401	0.575	0.420	0.464	0.357	0.537	0.489	0.483	0.401
INT_1	0.795	0.545	0.617	**0.916**	0.534	0.556	0.609	0.633	0.484	0.626	0.651	0.607
INT_2	0.674	0.524	0.734	**0.910**	0.670	0.529	0.664	0.779	0.643	0.673	0.761	0.669
LI_1	0.587	0.520	0.683	0.593	**0.849**	0.627	0.664	0.604	0.656	0.798	0.708	0.636
LI_2	0.595	0.435	0.651	0.518	**0.902**	0.516	0.602	0.627	0.875	0.614	0.766	0.579
LI_3	0.656	0.446	0.632	0.572	**0.799**	0.571	0.692	0.674	0.899	0.650	0.732	0.596
PBC_1	0.429	0.295	0.561	0.436	0.602	**0.801**	0.583	0.425	0.547	0.603	0.595	0.535
PBC_2	0.599	0.656	0.388	0.502	0.449	**0.773**	0.513	0.524	0.416	0.507	0.573	0.481
PI_1	0.637	0.560	0.616	0.596	0.708	0.617	**0.868**	0.621	0.606	0.729	0.743	0.662
PI_2	0.641	0.417	0.565	0.587	0.684	0.562	**0.867**	0.555	0.692	0.615	0.740	0.587
PI_3	0.561	0.433	0.601	0.580	0.530	0.584	**0.787**	0.613	0.544	0.833	0.632	0.711
PU_1	0.586	0.466	0.692	0.637	0.673	0.558	0.616	**0.866**	0.631	0.745	0.702	0.698
PU_2	0.668	0.562	0.728	0.668	0.678	0.516	0.589	**0.908**	0.682	0.658	0.738	0.684
PU_3	0.598	0.396	0.668	0.708	0.614	0.440	0.609	**0.807**	0.614	0.617	0.710	0.667
PU_4	0.664	0.450	0.542	0.648	0.608	0.551	0.620	**0.860**	0.603	0.637	0.687	0.641
RFC_1	0.595	0.435	0.651	0.518	0.802	0.516	0.602	0.627	**0.875**	0.614	0.766	0.579
RFC_2	0.656	0.446	0.632	0.572	0.799	0.571	0.692	0.674	**0.899**	0.650	0.732	0.596
SE_1	0.615	0.458	0.693	0.629	0.647	0.575	0.715	0.737	0.603	**0.906**	0.708	0.903
SE_2	0.561	0.433	0.601	0.580	0.530	0.584	0.787	0.613	0.544	**0.833**	0.632	0.711
SE_3	0.587	0.520	0.683	0.593	0.749	0.627	0.664	0.604	0.656	**0.798**	0.708	0.636
SI_1	0.703	0.483	0.670	0.676	0.660	0.566	0.700	0.773	0.656	0.742	**0.789**	0.738
SI_2	0.617	0.517	0.616	0.576	0.792	0.600	0.642	0.601	0.741	0.630	**0.820**	0.564
SI_3	0.603	0.493	0.619	0.635	0.697	0.687	0.734	0.661	0.655	0.727	**0.852**	0.698
SI_4	0.598	0.513	0.645	0.644	0.699	0.544	0.689	0.663	0.687	0.577	**0.804**	0.532
SI_5	0.656	0.412	0.585	0.565	0.621	0.584	0.604	0.603	0.646	0.566	**0.748**	0.592
TFC_1	0.615	0.458	0.693	0.629	0.647	0.575	0.715	0.737	0.603	0.906	0.708	**0.913**
TFC_2	0.641	0.459	0.631	0.654	0.654	0.610	0.702	0.696	0.613	0.731	0.722	**0.923**

ii. The Fornell-Larcker Criterion

When using the Fornell-Larcker criterion, the square root of the average variance extracted (AVE) of each construct must be higher than the construct's correlation with any other construct in the model (Hair et al., 2014). The assessment of the Fornell-Larcker criterion was shown in Table 4.34 below.

From the table, it can be seen that the square root of average variance extracted (AVE) of every constructs are higher that the constructs' correlation with others. For example, the reflective construct attitude (ATT) has a value of 0.829 for the square root of its average variance extracted (AVE). This value was then compared with all the correlation values in the attitude (ATT) column.

The square roots of the average variance extracted (AVE) for all the reflective constructs were found to be higher than the correlations of the constructs with other latent variables in the path model. They were, ATT (0.829), COMP (0.862), EU (0.803), INT (0.913), LI (0.851), PBC (0.787), PI (0.841), PU (0.861), RFC (0.887), SE (0.847), SI (0.803), and TFC (0.918). These results showed that the discriminant validity has been established.

Table 4.34

The Fornell-Larcker criterion

	ATT	COMP	EU	INT	LI	PBC	PI	PU	RFC	SE	SI	TFC
ATT	**0.829**											
COMP	0.668	**0.862**										
EU	0.677	0.597	**0.803**									
INT	0.806	0.585	0.739	**0.913**								
LI	0.720	0.547	0.770	0.658	**0.851**							
PBC	0.650	0.597	0.606	0.594	0.670	**0.787**						
PI	0.730	0.560	0.704	0.697	0.766	0.697	**0.841**					
PU	0.733	0.547	0.761	0.772	0.747	0.600	0.706	**0.861**				
RFC	0.706	0.497	0.723	0.616	0.955	0.614	0.732	0.735	**0.887**			
SE	0.696	0.558	0.781	0.711	0.805	0.706	0.844	0.770	0.713	**0.847**		
SI	0.790	0.604	0.782	0.772	0.765	0.742	0.741	0.723	0.743	0.709	**0.803**	
TFC	0.684	0.499	0.720	0.699	0.709	0.646	0.771	0.780	0.662	0.888	0.779	**0.918**

Note. ** The numbers in bold are the values for the square root of its AVE

*** The numbers which is not bolded are the correlation values

Table 4.35 below summarized the result for the Reflective Measurement Model assessment, rounded to three decimal places. From the Table 4.35 below, it can be seen that all model evaluation criteria have been met. This provided support for the measures' reliability and validity.

Table 4.35

Result summary for Reflective Measurement Models

Construct	Indicators	Outer loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)	Discriminant validity established?
Perceived Usefulness (PU)	PU_1	0.866	0.920	0.741	Yes
	PU_2	0.908			
	PU_3	0.807			
	PU_4	0.860			

Table 4.35 continued

Construct	Indicators	Outer loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)	Discriminant validity established?
Ease of Use (EU)	EU_1 EU_2 EU_3	0.891 0.838 0.663	0.843	0.645	Yes
Compatibility (COMP)	COMP_1 COMP_2 COMP_3	0.854 0.842 0.889	0.897	0.743	Yes
Ease of Use (EU)	EU_1 EU_2 EU_3	0.891 0.838 0.663	0.843	0.645	Yes
Compatibility (COMP)	COMP_1 COMP_2 COMP_3	0.854 0.842 0.889	0.897	0.743	Yes
Peer Influence (PI)	PI_1 PI_2 PI_3	0.868 0.867 0.787	0.879	0.708	Yes
Lecturer Influence (LI)	LI_1 LI_2 LI_3	0.849 0.902 0.799	0.887	0.724	Yes
Self-Efficacy (SE)	SE_1 SE_2 SE_3	0.906 0.833 0.798	0.884	0.717	Yes
Resources Facilitating Condition (RFC)	RFC_1 RFC_2	0.875 0.899	0.881	0.787	Yes
Technology Facilitating Condition (TFC)	TFC_1 TFC_2	0.913 0.923	0.915	0.843	Yes
Attitude (ATT)	AT_1 AT_2 AT_3	0.910 0.697 0.866	0.867	0.688	Yes
Social Influence (SI)	SI_1 SI_2 SI_3 SI_4 SI_5	0.789 0.820 0.852 0.804 0.748	0.901	0.645	Yes

Table 4.35 continued

Construct	Indicators	Outer loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)	Discriminant validity established?
Perceived Behavioural Control (PBC)	PBC_1 PBC_2	0.801 0.773	0.765	0.620	Yes
Behavioural Intention (INT)	INT_1 INT_2	0.916 0.910	0.909	0.833	Yes

Stage 6: assessing PLS-SEM results of the Structural Model. After the Reflective Measurement Models have been assessed and the construct measures have been confirmed to be reliable and valid, the next step involved the evaluation of the Structural Model. Figure 4.27 below shows the structural model of this research.

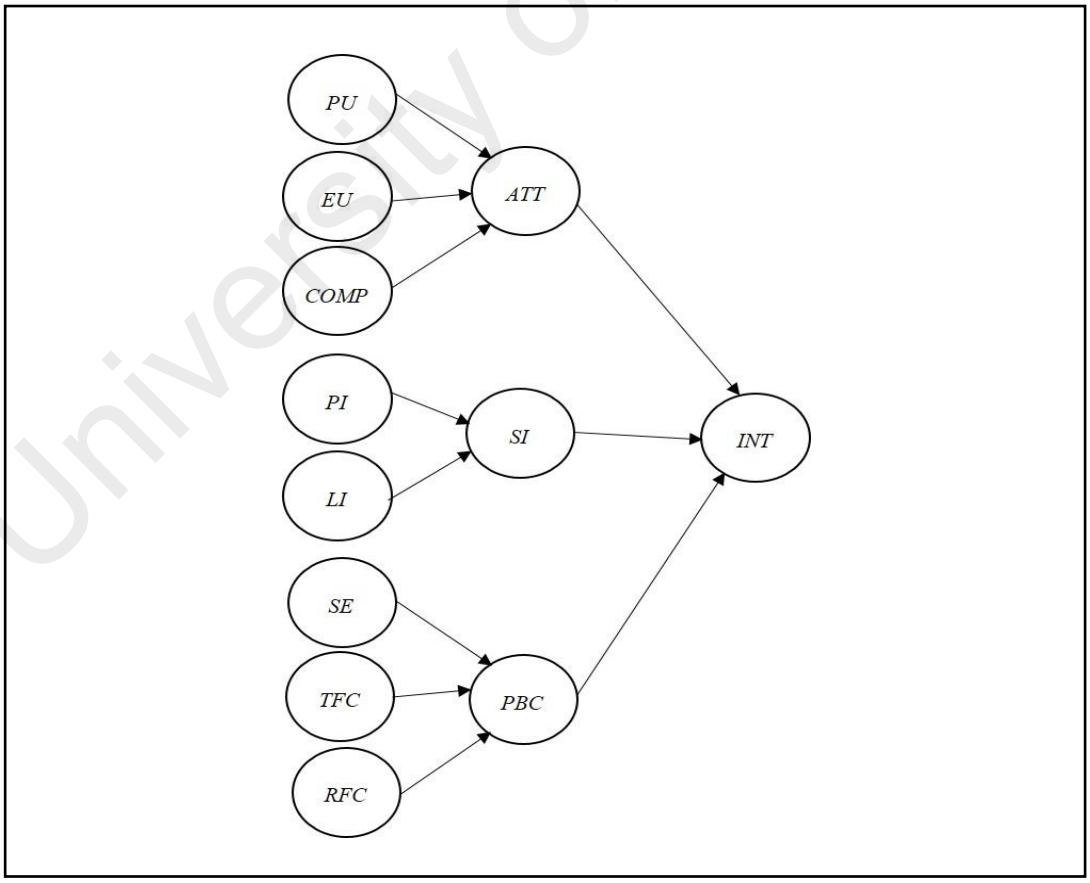

Figure 4.27. The research's Structural Model

The assessment of the Structural Model involved the examination of the model's predictive capabilities. There were five (5) systematic approaches involving the assessment of the structural model, as suggested by Hair et al. (2014). The steps are shown in Figure 4.28 below.

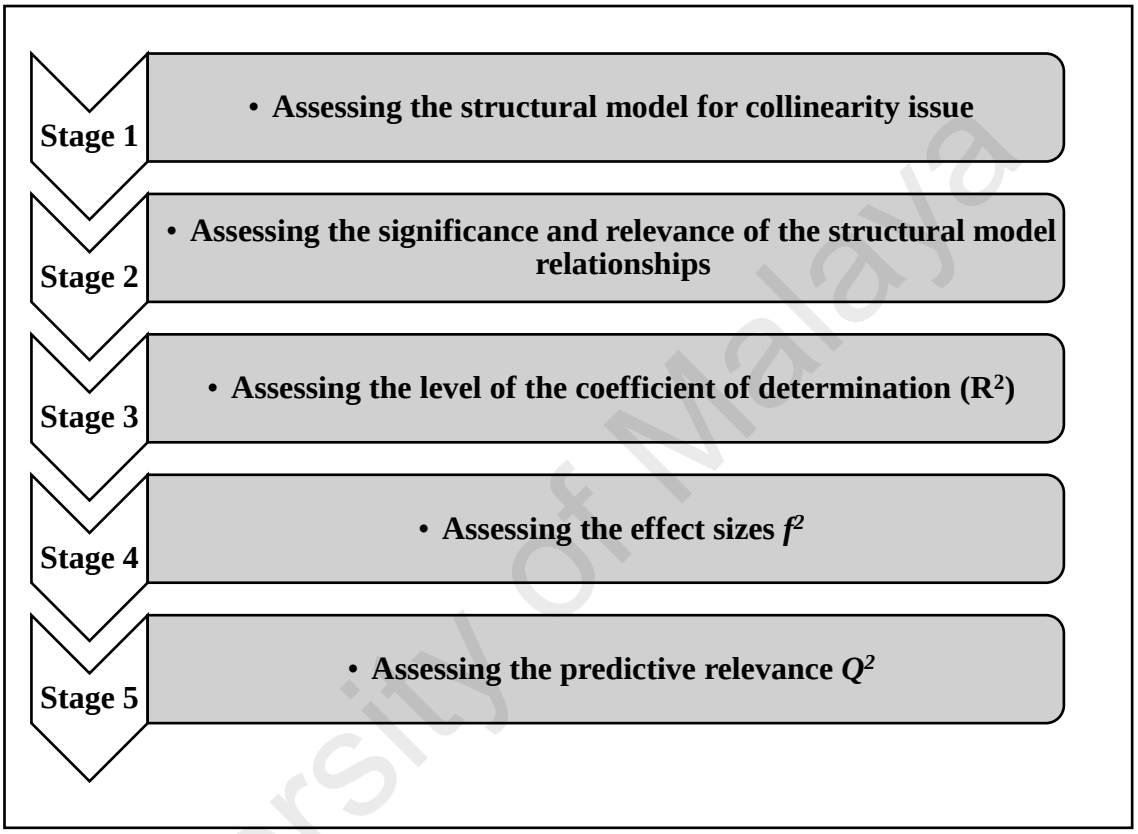

Figure 4.28. Structural Model assessment procedure. Adapted from *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (p. 169), by J. F. Hair, G. T. M. Hult, C. Ringle and M. Sarstedt, 2014, Thousand Oaks, California: Sage Publications. Copyright 2014 by Sage Publications.

Stage 1: assessment of collinearity using variance inflation value (VIF). Collinearity assessment in SmartPLS 3.0 involved the process of measuring the values of variance inflation factors (VIF), in which each set of predictor constructs were examined separately for each of the sub-parts of the structural model.

Each of the predictor construct's tolerance, or variance inflation factors (VIF) value should be higher than 0.20, or lower than 5.0 (Hair et al., 2014). If there is a collinearity issue involved, it is suggested to consider eliminating constructs, merging predictors into a single construct, or creating higher-order constructs to treat collinearity issues (Hair et al., 2014).

The following sets of predictor constructs were run to assess collinearity:

i. Perceived usefulness (PU), ease of use (EU), and compatibility (COMP) as predictors of attitude (ATT);
ii. Peer influence (PI) and lecturer influence (LI) as predictors of social influence (SI);
iii. Self-efficacy (SE), technology facilitating condition (TFC), and resource facilitating condition (RFC) as predictors of perceived behavioural control (PBC); and
iv. Attitude (ATT), social influence (SI), and perceived behavioural control (PBC) as predictors of behavioural intention (INT).

Table 4.36 below displays the result of collinearity assessment. Based on the result, it was found that all variance inflation factors (VIF) values of the analysis were below the threshold level of 5.0. Therefore, collinearity among the predictor constructs was not an issue in the structural model.

Table 4.36

Result of the collinearity assessment

First Set		Second Set		Third Set		Fourth Set	
Constructs	VIF	Constructs	VIF	Constructs	VIF	Constructs	VIF
PU	2.457	PI	2.423	SE	4.468	ATT	2.725
EU	2.678	LI	2.423	TFC	4.783	SI	3.503
COMP	1.605			RFC	2.052	PBC	2.280

Stage 2: assessing the significance and relevance of the Structural Model relationships using path coefficient and bootstrapping routine. When PLS algorithm was applied, path coefficients, or the estimated path relationships for the structural model was obtained. Path coefficients represents the hypothesized relationships among the constructs and have a standardized value between -1 and +1 (Hair et al., 2014).

Table 4.37 below displays the path coefficient and its indication. Path coefficient value closer to +1 indicates a strong positive relationship, while -1 indicates a strong negative relationship. On the other hand, the closer the value of path coefficient to 0, the weaker the relationship is (refer Table 4.37 below).

Table 4.37

Path coefficient values and its indication

Path coefficient value	Indication
Closer to +1	Strong positive relationship
Closer to -1	Strong negative relationship
Closer to 0	Weak relationship

Reprinted from *A primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (p. 169), by J. F. Hair, G. T. M. Hult, C. Ringle and M. Sarstedt, 2014, Thousand Oaks, California: Sage Publications. Copyright 2014 by Sage Publications.

Figure 4.29 below exhibits the significance level of the path coefficients values of the three (3) constructs. Looking at the relative importance of the exogenous driver constructs in predicting the dependent construct attitude (ATT), it can be seen that perceived usefulness (PU = 0.441) was the most important construct, followed by compatibility (COMP = 0.347), and lastly ease of use (EU = 0.134).

From the result, it can also be seen that lecturer influence (LI = 0.534) was the most important driver construct for social influence (SI). This was followed by peer influence (PI = 0.431). For the dependent construct perceived behavioural control (PBC), self-efficacy (SE = 0.499) was found to be the most important driver construct, followed by resource facilitating condition (RFC = 0.221) and subsequently technology facilitating condition (TFC = 0.057).

Next, looking at the relative importance of the driver constructs for behavioural intention (INT), attitude (ATT = 0.525) was found to be the most important, followed by social influence (SI = 0.377). Lastly, perceived behavioural control (PBC = -0.027) was found to have very little negative importance on behavioural intention (INT).

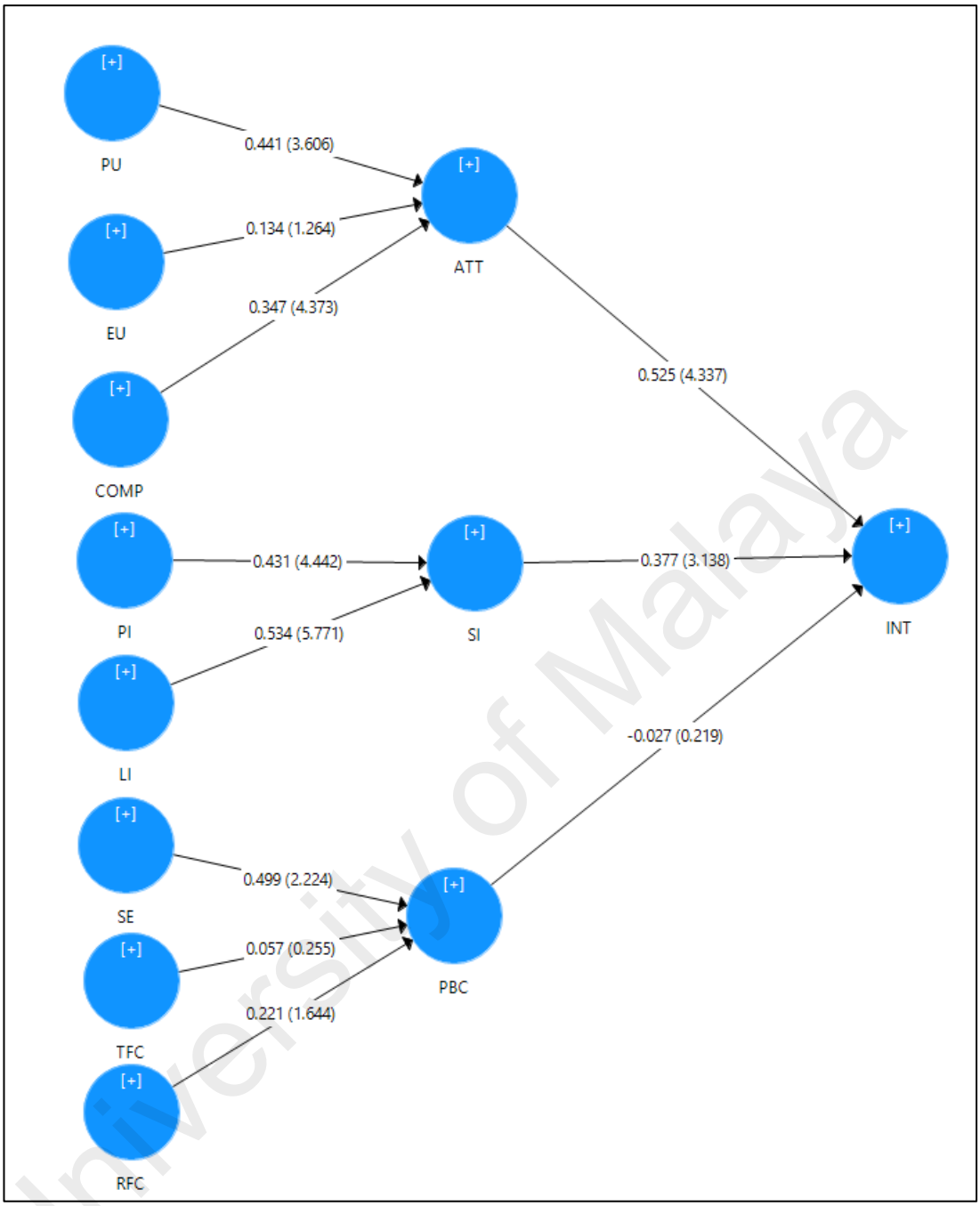

Figure 4.29. Result of the path coefficients values which shows the constructs' relative importance and significance

Note. The path coefficient values are the values indicated at the driver construct's arrow and the values in brackets are *t*-values obtained from the bootstrapping routine

Table 4.38 below summarizes the structural model path coefficients arranged according to the driver construct's relative importance and its significance. However, the significance of a path coefficient depends on its standard error by performing the bootstrapping routine, which allows the computation of t-value to assess whether the indicator significantly contributes to its corresponding constructs.

When the *t*-value is larger than the critical value, which is at 1.96 (significance level = 5%), it is said that the coefficient is significant at a certain error probability (Hair et al., 2014). The bootstrapping routine was run using 5000 sub-samples as suggested by Hair et al. (2014) and the t-values are obtained.

Table 4.38 below displays the path coefficients and *t*-values. It was found that all relationships in the structural model were significant where the t-values were above the critical value of 1.96 (significance level = 5%), except for EU → ATT, RFC → PBC, TFC → PBC, and PBC → INT.

Table 4.38

Significance testing results of the structural model path coefficients

	Path coefficients	*t*-values	Significance
PU → ATT	0.441	3.606	Significant
COMP → ATT	0.347	4.373	Significant
EU → ATT	0.134	1.264	Not significant
LI → SI	0.534	5.771	Significant
PI → SI	0.431	4.442	Significant
SE → PBC	0.499	2.224	Significant
RFC → PBC	0.221	0.255	Not significant
TFC → PBC	0.057	1.644	Not significant
ATT → INT	0.525	4.337	Significant
SI → INT	0.377	3.138	Significant
PBC → INT	-0.027	0.219	Not significant

Stage 3: assessing the level of the coefficient of determination (R^2). Coefficient of determination (R^2) is the value which measure the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's, or dependent variable's, actual and predicted values (Hair et al., 2014).

The coefficient represents the exogenous latent variable's, or the independent variable's combined effects on the endogenous latent variable (Hair et al., 2014). R^2 value ranges between 0 and 1, where a higher value indicates a higher level of predictive accuracy. R^2 values of 0.75 are described as substantial, while 0.50 is moderate, and 0.25 is considered weak (Hair et al., 2014).

Table 4.39 below displays the result of coefficient determination (R^2). Based on the result, the coefficient of determination (R^2) values for attitude (ATT) was 0.646, social influence (SI) 0.825, perceived behavioural control (PBC) 0.524, and behavioural intention (INT) 0.698. Thus, it can be considered that the data have a good level of predicting accuracy.

Table 4.39

The coefficient of determination (R^2) result

Construct	R^2
Attitude (ATT)	0.646
Social influence (SI)	0.825
Perceived behavioural control (PBC)	0.524
Behavioural intention (INT)	0.698

Stage 4: assessing the effect sizes, f^2. The effect sizes, which is denoted as f^2, measures the impact of a specific predictor construct on an endogenous construct, or dependent variable. Effect sizes, f^2, measures the change in R^2 values when a certain exogenous construct, or independent variable, is removed from the model. This is to measure the real impact of an exogenous construct to the endogenous construct.

According to Cohen (1988), 0.02 is considered as small effect, 0.15, medium effect, and 0.35 large effect (as cited in Hair et al., 2014). Table 4.40 below shows the result for the effect sizes, f^2.

Based on Table 4.40 below, the effect size for the predictive value of attitude (ATT) to behavioural intention (INT) was 0.335. The value indicated that attitude (ATT) has a large effect in producing the coefficient of determination, which is the R^2 value for behavioural intention (INT). On the other hand, the effect size for the predictive value of social influence (SI) to behavioural intention (INT) was 0.135.

The value indicated that social influence (SI) has a medium effect in producing the coefficient of determination, which is the R^2 value for behavioural intention (INT). Lastly, the effect size for the predictive value of perceived behavioural control (PBC) to behavioural intention (INT) was 0.001. The value indicated that perceived behavioural control (PBC) has a small effect in producing the coefficient of determination, which is the R^2 value for behavioural intention (INT).

Table 4.40

Result summary for the effect sizes, f^2

	f^2	Effect Size
Compatibility (COMP) → Attitude (ATT)	0.212	Medium
Ease of use (EU) → Attitude (ATT)	0.019	Small
Perceived usefulness (PU) → Attitude (ATT)	0.224	Medium
Resource facilitating condition (RFC) → Perceived behavioural control (PBC)	0.050	Small
Self-efficacy (SE) → Perceived behavioural control (PBC)	0.096	Small
Technology facilitating condition (TFC) → Perceived behavioural control (PBC)	0.001	Small
Lecturer influence (LI) → Social influence (SI)	0.672	Large
Peer influence (PI) → Social influence (SI)	0.438	Large
Attitude (ATT) → Behavioural intention (INT)	0.335	Large
Perceived behavioural control (PBC) → Behavioural intention (INT)	0.001	Small
Social influence (SI) → Behavioural intention (INT)	0.135	Medium

Stage 5: assessing the predictive relevance, Q^2. The last stage involves assessing the predictive relevance of the model, using the Stone-Geisser's Q^2 value. When the model exhibits a predictive relevance, it accurately predicts the data points of indicators in the reflective measurement models of endogenous constructs (Hair et al., 2014).

In the structural model, Q^2 value which is larger than zero for the reflective construct indicate the model's predictive relevance for the particular construct (Hair et al., 2014). This can be obtained by the blindfolding procedure using SmartPLS 3.0.

Q^2 values of 0.02 indicates small predictive relevance, while 0.15 medium predictive relevance, and 0.35 large predictive relevance for a selected endogenous construct (Hair et al., 2014).

Result for the predictive relevance are shown in Table 4.41 below. From the table, it can be seen that all Q^2 values were above zero (behavioural intention (INT) = 0.561, social influence (SI) = 0.522, attitude (ATT) = 0.424, and perceived behavioural control (PBC) = 0.278), thus providing support for the model's predictive relevance for all four endogenous constructs.

Table 4.41

Results of the predictive relevance

Endogenous Latent Variable	Q^2	Predictive Relevance
Attitude (ATT)	0.424	Large
Social influence (SI)	0.522	Large
Perceived behavioural control (PBC)	0.278	Medium
Behavioural intention (INT)	0.561	Large

In order to answer the fourth research question, which was to find out among the factors (attitude, social influence, and perceived behavioural control) that best predict students' intention to use Wiki in the future, the results from the structural model assessment were used.

Based on the result, it was found that students' attitude (ATT) has the highest significance effect on predicting students' intention (INT) to use Wiki in the future, followed by social influence (SI). However, perceived behavioural control (PBC) was found to have very little negative importance and non-significant in predicting

students' intention to use Wiki in the future. Figure 4.30 below displays the overall result of the structural model assessment

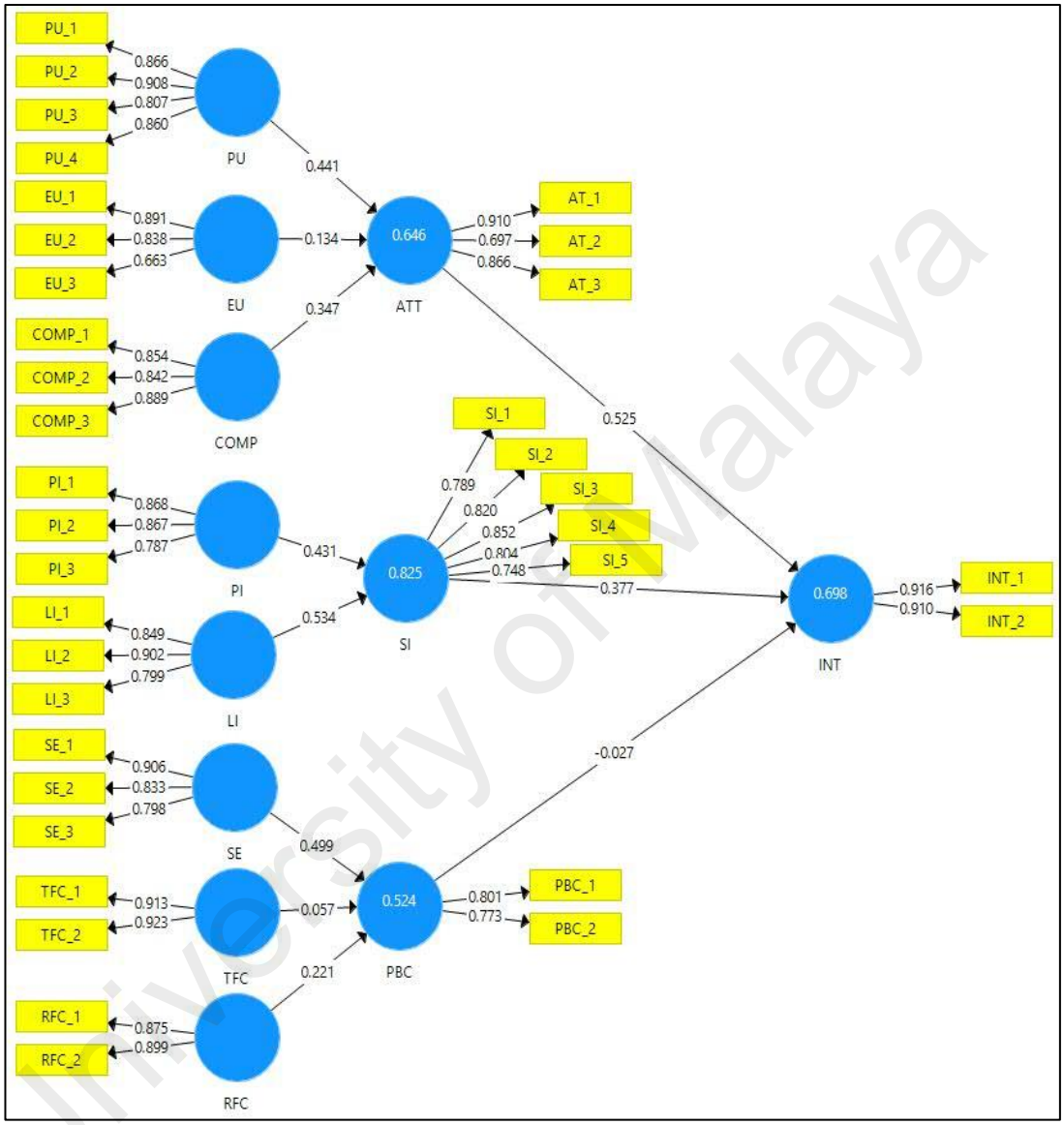

Figure 4.30. The overall result of the Structural Model assessment

Note. ** Values within the constructs, is R^2

*** Values that lies on the arrow between construct and indicators represent the outer loadings for the measurement model

**** Values that lies on the arrow between constructs represent the path coefficient for the structural model

Summary of Chapter

This chapter presented the result on the analysis of quantitative data from the online survey, together qualitative data from the open-ended section of the online survey and focus group interview. The results were discussed based on the research questions and hypotheses. The findings from this chapter were then further discussed in detail in the subsequent chapter, which is Chapter Five.

The initial descriptive statistics explained the demographic profile of the respondents and the evaluation of Wiki to supplement classroom instruction. Next, the analysis of normality, skewness and kurtosis were presented to prove that the data satisfies the minimum level of normality.

Overall, for the first research question, results from the quantitative analysis which was obtained using descriptive analysis (frequency, percentages, mean, and standard deviation), it was found that learners positively perceived Wiki as beneficial in five (5) areas, which are: (1) motivation; (2) group interaction; (3) knowledge sharing; (4) confidence in writing; and (5) improvement in writing. From the statements of qualitative analysis findings, which was obtained through the constant comparative method, four (4) themes emerged. The four themes were: (1) learning benefits; (2) collaboration benefits; (3) technology advantages; and (4) challenges.

Subsequently, the result of correlational analysis for the second research question indicated that positive relationships were found between determinants (attitude, social influence, and perceived behavioural control) and students' behavioural intention towards the use of Wiki. The result supported the eleven (11) hypotheses that were proposed for this study.

Lastly, based on the PLS-SEM analysis, the result for the third research question showed that students' attitude is the highest significant predictor of students' intention to adopt Wiki in the future, followed by social influence. On the other hand, perceived behavioural control was found to have very little negative importance in predicting students' intention to use Wiki in the future and it is non-significant.

CHAPTER 5

DICUSSION AND CONCLUSION

Introduction

The aim of this study was to explore the factors influencing students' perceptions towards the pedagogical benefits of Wiki in terms of confidence in writing, knowledge sharing, improvement in writing, group interaction, and motivation. Next, the second purpose of this study was to explore the relationship between three factors, which were attitude, social influence, and perceived behavioural control with behavioural intention towards the use of Wiki. The factor which best predict students' intention to use Wiki was also investigated.

This final chapter summarizes and discusses further the findings from Chapter Four (4), focusing on addressing the research questions. This chapter also discusses the implications of the study as well as recommendations that could be made for future research.

Discussion of the Research Questions

Research Question 1. The first research question was as follows:

What are the overall students' profile on the pedagogical benefits of Wiki?

The first research question was further expanded into five sub-questions and the subsequent section discussed the results respectively. Based on the result in Chapter Four (4), it was found that the learners positively perceived Wiki as a valuable tool to be incorporated with teaching and learning, namely in five (5) areas, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation.

Research Question 1(a). The research question was as follows:

How do students perceive the pedagogical benefit of Wiki in terms of confidence in writing?

The evidence of positive perception towards Wiki in terms of confidence in writing was found when answering the Research Question 1(a), where the mean of the summed score of the Confidence in Writing subscale was 18.80 (score ranged between 6, denoting a "low perception" to 30, denoting "high perception" and mean score above 18 exhibits a positive perception).

The result found that learners positively perceived Wiki as a valuable tool in increasing their confidence in writing. The findings from this study validates previous findings in regards to the ability of Wiki to increase learners' confidence in writing (Basar & Yusop, 2014; Ertmer et al., 2011; Franco, 2008; Li et al., 2010; Li et al., 2012; Mak & Coniam, 2008; Miyazoe, 2010; Singh et al., 2013; Wichadee, 2013; Woo et al, 2011; Zorko, 2009).

The result was further proven from the quantitative findings where a majority of learners, which was 66.1%, agreed and strongly agreed that using Wiki in class helped them to improve their confidence in writing. When students are confident, they tend to be inclined to produce more text than required because they have the increased motivation to do it.

The statement was also further supported by the quantitative findings where a large number of respondents, which was 63.3%, stated that they produced more text than required in their group Wiki page during class activities or assignments. This is because it can act as a confidence booster for the students and gives the students a sense of pride with their work done, which can be viewed by others on the class Wiki. The result is in line with previous studies where it was also found that Wiki has the

ability to increase students' confidence in writing (Basar & Yusop, 2014; Mak & Coniam, 2008).

In addition, result from the quantitative findings also showed that a large number of students, which was 60.6%, have become more active in writing since more people can read their group's works. This was due to the open nature of Wiki where users can view the work of others as long as they have access to it. The qualitative findings further revealed that students are more confident working on Wiki compared to participating physically in the class.

Furthermore, the students stated that they were more confident to talk and discuss openly in Wiki without feeling shy or ashamed as compared to voicing it out verbally during the face-to-face classroom. Compared to traditional writing, where students only write and submit their assignments for the course instructor, in Wiki they are writing for a broad audience, which could increase their confidence in writing (Lee, 2010). Students who are socially introverted may find that online environment are more comfortable to them as compared to openly participating in the traditional face-to-face instruction.

In addition, comments made by the course lecturer in Wiki also gave an impact to students' confidence, where it was found that it could help boost their confidence in writing. The evidence was found from quantitative result where a majority of learners, which were 75.2%, noted that comments from the course instructor boosted their confidence in writing when using the class Wiki. As mentioned by students in the qualitative result, when a lecturer gave out comments and feedbacks about their works in the class Wiki, it gave them an indication that they are doing the right thing, moving in a right direction and made them more aware of their mistakes. It also helped the students to not repeat any of their mistakes again.

In addition, receiving immediate feedback from the course instructor via Wiki could help students progress with their work faster and could correct their work instantly. This proved that lecturer's feedback is crucial in students' learning progress, which could boost their confidence in writing. Consequently, the commenting feature available in Wiki could be beneficial for course lecturer to give comments and immediate feedbacks to the learners. The result is in line with previous studies where it was also found that the feedbacks and comments made by the course instructor in the class Wiki boosted their confidence in writing (Basar & Yusop, 2014; Wichadee, 2013; Woo et al., 2011, Zorko, 2009).

Therefore, the course instructor should play a critical role in assisting and facilitating students' as well as to keep them motivated and active throughout the course in a virtual learning environment. This is because the instructor could act as a moderator to encourage learners to keep going and participating in the tasks given. This is to ensure that students play an active and participatory role in their learning process.

Apart from lecturer's comments, the findings also found that peers' comments in the class Wiki has the ability to boost students' confidence in writing. The evidence was found from the quantitative findings result where a large number of students, which were 70.65%, positively stated that receiving comments from their peers could boost their confidence in writing using Wiki. This was further supported by the qualitative result where encouragements and feedbacks received from peers via the commenting feature in Wiki are able to increase learners' confidence in writing.

This shows that the public nature of Wiki, where everyone is able to view the work of others and leave comments about their peers' work, could encourage learners to be more active in their learning. This findings corroborate with previous studies

where it was found that interaction with peers proved to be beneficial for students' learning (Chong et al, 2011; Li et al., 2012; Woo et al., 2011; Zorko, 2009).

The results proved that in a web-based collaboration environment, both students and lecturers should plays an active role in it. As noted by Srinivas (n.d.) the collaborating process is not only between learners who collaborate with one another under the guidance of course instructor, however, the instructor herself plays a part in the collaborative process too (as cited in Palloff & Pratt, 2010). This can be done using the commenting feature available in Wiki. The commenting feature in Wiki enables learners to receive comments from their peers as well as instructor. This issue interrelates with the motivation aspect where communication is an important factor in a virtual learning environment in order to gain learners' interest as well as to keep them motivated.

In addition, the conflict that occurs among group members while working on their task in the group Wiki was also found to be beneficial to the students rather than a disadvantage. This is called constructive conflict. Constructive conflict can be seen as a vehicle to enhance the construction of meaning, or learning behaviour, giving rise to a mutually-shared cognition which in turn leading to higher team effectiveness (Van den Bossche, Gijselaers, Segers & Kirschner, 2006).

This was proven by the data from the quantitative result, where it was found that a majority of learners, which were 64.2%, positively stated that on the whole, the conflict that occurs among group members brought more advantages than disadvantages to them. When constructive conflict occurs, learners are allowed to voice out their ideas, make better decisions, and learn to negotiate with others in order to increase understanding, which in turn would increase their confidence level.

On the whole, it was found that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of confidence in writing. The findings are in line with previous studies which stated that Wiki could boost learners' confidence in writing by interacting and doing tasks (Basar & Yusop, 2014; Ertmer et al., 2011; Franco, 2008; Li et al., 2010; Li et al., 2012; Mak & Coniam, 2008; Miyazoe, 2010; Singh et al., 2013; Wichadee, 2013; Woo et al, 2011; Zorko, 2009).

This shows that Wiki are able to provide students with a conducive online learning environment which could increase their confidence to actively take part in the teaching and learning activities. This may be due to the open platform of Wiki where students write to a broad audience instead of just writing and submitting their work to the course instructor. This helps increase communication and in turn, encouraging the collaboration act to happen.

Research Question 1(b). The research question was as follows:

How do students perceive the pedagogical benefit of Wiki in terms of knowledge sharing?

The evidence of positive perception towards Wiki in terms of knowledge sharing was found when answering the Research Question 1(b), where the mean of the summed score of the Knowledge Sharing subscale was 20.20 (score ranged between 5, denoting a "low perception" to 25, denoting "high perception" and mean score above 15 exhibits a positive perception).

The findings from the result found that learners positively perceived Wiki as a valuable tool to supplement in-class learning in assisting the knowledge sharing process. The findings from this study validates previous findings in regards to the ability of Wiki to facilitate knowledge sharing effort (Basar & Yusop, 2014; Biasutti

& El-Deghaidy, 2012; Chong et al., 2011; Cole, 2009; Elgort et al, 2008; Hughes & Narayan, 2009; Li et al., 2010; Lund, 2008; Notari, 2006; Raman, 2006; Singh et al., 2013; Su & Beaumont, 2011; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009).

The social affordances of Wiki allows the facilitation of knowledge sharing and collaboration efforts among users to happen. This was proven by the quantitative findings where a majority of learners, which were 87.2%, agreed and strongly agreed that the Wiki features allow easy content and knowledge sharing. The findings from qualitative data further supported the statement where Wiki was found to support collaborative efforts among users. From the qualitative results, students revealed that they can write and share ideas more easily in the group Wiki as compared to participating in a physical classroom. Wiki allows students to work together, compile data, as well as share information and ideas to complete their learning tasks.

The technical characteristics of Wiki enable users to have a two-way communication and this allows knowledge sharing effort to take place. The result is in line with previous studies where it was found that Wiki has the potential for collective knowledge development (Lund, 2008; Woo et al., 2011). As Wiki allows collective feedback and transparency in sharing their work, students can work together and support each other in their learning process.

This is due to the concept of Wiki being an open system where anyone can add or edit the Wiki page, as well as sharing information with others, which makes it beneficial in supporting knowledge sharing effort between users (Raman, 2006). As stated by Biasutti and El-Deghaidy (2012), online Wiki activities helped students in their sharing of knowledge through the act of teamwork, for instance, through the modification of the work of others, the addition of elements, and the correction of some information.

In addition the open nature of Wiki makes it a useful tool to be incorporated in class for knowledge sharing. This was supported by the quantitative findings where it was found that a majority of students, which were 78.9%, agreed and strongly agreed that the opportunity to look at other groups' works in Wiki provides them with more perspectives as to how the work or task could be done. As mentioned in the qualitative findings, students find that collaboration is fun and is better than working individually. This is because the students can view not only their group work, but also others. This gave them an additional idea and insight on how to do their assignments.

Moreover, when students can read other groups' work and see how others do it, it helped students to check whether they were moving in the right direction, learn from better groups, or learn from mistakes made by others which could help them not to repeat the same mistake (Zorko (2009). The findings are in line with previous studies where it was found that Wiki is beneficial to support knowledge sharing effort among students (Basar & Yusop, 2014; Li et al., 2010; Zorko, 2009)

Additionally, the public nature of Wiki also allows the facilitation of knowledge sharing effort where everyone can view each other's works, which in turn could increase students' motivation in doing their tasks. This was proven by the quantitative findings where a majority of students, which were 75.2%, agreed and strongly agreed that the opportunity to look at other groups' work motivated them to put in more effort in their own work. In addition, from the quantitative findings, it was found that a large number of students, which were 85.3%, agreed and strongly agreed that looking at work done better than theirs motivated them to put in more effort in their group's work.

This is because the Wiki groups were made viewable by everyone so the students' writing products can not only be read by the course instructor, but to the whole class. Students are more aware of their own work and are more careful with what they write because there are wider audiences viewing their work. Comparing and commenting is important to the learners because not only they can know what others are producing, but it also has a self-evaluation effect because if other contributions have a better quality than their work, they are more motivated to increase the quality of their work (Notari, 2006). This resulted in an increased motivation to put in more effort and produce their best work for others to view.

The knowledge sharing in Wiki enable students to view each other's works. This causes students to be more careful in their writings as there are more audiences viewing their work. The statement was also supported by the quantitative findings where a large number of students, which were 70.6%, agreed and strongly agreed that when they write on Wiki, there are more audiences viewing their work, thus making them more careful in their writings.

This was further supported by the qualitative findings where students revealed that they tend to think more and are more careful than usual when they work on their Wiki This may due to the broader audience in the Wiki as compared to just submitting their work to the lecturer. The findings are in line with previous studies where Wiki's social and collaborative affordances proved to be beneficial (Basar & Yusop, 2014; Li et al., 2010; Zorko, 2009)

On the whole, it was found that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of knowledge sharing**.** The result was in line with previous studies which found that Wiki was able to facilitate knowledge sharing (Basar & Yusop, 2014; Chong et al., 2011; Elgort, 2008; Hughes & Narayan,

2009; Li et al., 2010; Lund, 2008; Notari, 2006; Singh et al., 2013; Woo et al., 2011; Zorko, 2009).

As highlighted by Li et al. (2010), Wiki was found to be beneficial in facilitating collaborative learning within groups and enhances group interaction. This may due to the technological nature of Wiki where it is supporting the knowledge sharing efforts. The fact that learners could add, edit or delete content in a Wiki, as well as the ability to view other group's Wiki enables them to learn and share information with their peers.

Research Question 1(c). The research question was as follows:

How do students perceive the pedagogical benefit of Wiki in terms of improvement in writing?

The evidence of positive perception towards Wiki in terms of improvement of writing was found when answering the Research Question 1(c), where the mean of the summed score of the Improvement in Writing subscale was 19.46 (score ranged between 6, denoting a "low perception" to 30, denoting "high perception" and mean score above 18 exhibits a positive perception).

The result found that learners positively perceived Wiki as a valuable tool to improve their writing. This finding validates previous findings in regards to the ability of Wiki to increase learners' improvement in writing (Altanopoulou et al., 2015; Biasutti & El-Deghaidy, 2012; Chong et al., 2011; Cubric, 2007; Franco, 2008; Kwan & Yunus, 2015; Lee, 2010; Li et al., 2010; Miyazoe & Anderson, 2010; Wheeler et al., 2008; Wichadee, 2013; Woo et al., 2011; Zorko, 2009).

The findings from this study further supported the claim that learners positively perceived Wiki as beneficial in improving their writing. Based on the result of the quantitative findings, a majority of students, which were 75.2%, agreed and strongly agreed that learning collaboratively using Wiki helped enhance the development of their writing skills.

The statement was further supported by data from the qualitative findings where students tend read more when using Wiki for their assignments, especially when it comes to examples from other groups. This is turn will help develop their writing skills when it comes to their turn to submit their contribution in the group Wiki. This finding is in line with previous studies (Lee, 2010; Miyazoe, 2009; Woo et al., 2011)

Additionally, ccomments made by the course lecturer and peers in Wiki also could help improve students' writing. The evidence was found from quantitative result where a majority of learners, which were 73.4%, agreed and strongly agreed that comments received from peers and lecturer in Wiki helped improve their writing skills. It was found that students who reacted optimistically to the peer-correction process are more aware of their writing process and further improve their writing ability (Franco, 2008). In addition to peer-correction, students also value continuous feedback from the course instructor as it could improve their writing process (Cubric, 2007).

In addition, students who comment their peers' work in Wiki also found it to be beneficial for their writing. The evidence was found from quantitative result where a majority of learners, which were 72.5%, agreed and strongly agreed that the act of commenting in their own and other groups' Wiki page helped improve their writing skills. When student read the work of others and write comments, it reflects on their own writing process, thus making them learn more. Using Wiki enable student to self-reflect on their own writing which in turn help them to write better (Lee, 2010).

Furthermore, it was also found that Wiki has the ability to support interaction among learners, which in turn could improve students' writing ability. Result from the quantitative findings showed that a majority of learners, which were 76.1%, agreed and strongly agreed that interaction among peers in the class Wiki can better improve their writing ability as compared to only interacting with the course lecturer. Interactivity among peers in the class Wiki are also said to be beneficial in promoting the students' learning. This claim was further supported by the quantitative findings where a majority of learners, which were 74.3%, agreed and strongly agreed that they learned a lot from their own and other group members during class activities and assignments, which in turn enriched their writing skills.

Wiki has the ability to foster collaborative scaffolding through where students can help each other to re-organize the content and correct errors together (Lee, 2010). Scaffolding occurs when an individual who has higher level skills and knowledge provides guidance to a person who is less knowledgeable (Lee, 2010).

The characteristics and features of Wiki enable learners to work collaboratively and this helps them to learn from each other, and in this case improved their writing. Moreover, by collaborating using Wiki, the more knowledgeable students can also help and support their peers to progress in their writing whenever they encounter any issues or difficulties. This is in line with the concept of the zone of proximal development (ZPD) where students progress through their work with the help of a more knowledgeable peers.

On the whole, it was found that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of improvement in writing. The result corroborate with previous studies, where Wiki has the potential to increase learners' writing abilities when they learn collaboratively (Altanopoulou et al., 2015; Biasutti

& El-Deghaidy, 2012; Chong et al., 2011; Cubric, 2007; Franco, 2008; Kwan & Yunus, 2015; Lee, 2010; Li et al., 2010; Miyazoe & Anderson, 2010; Wheeler et al., 2008; Wichadee, 2013; Woo et al., 2011; Zorko, 2009).

Research Question 1(d). The research question was as follows:

How do students perceive the pedagogical benefit of Wiki in terms of group interaction?

The evidence of positive perception towards Wiki in terms of group interaction was found when answering the Research Question 1(d), where the mean of the summed score of the Group Interaction subscale was 15.14 (score ranged between 4, denoting a "low perception" to 20, denoting "high perception", and mean score above 12 demonstrated positive perception).

The result found that learners positively perceived Wiki as a valuable tool in enhancing group interaction between students. The finding from this study validates previous studies which found that Wiki has the ability to heighten group interaction (Chong et al., 2011; Franco, 2008; Kim et al., 2005; Li et al., 2010; Li et al., 2012; Singh et al., 2013; Su & Beaumont, 2010; Wheeler et al., 2008; Woo et al., 2011; Zorko, 2009)

The technological characteristic of Wiki enable it to act as a platform for people to work together in an asynchronous way. Wiki allows user to share files and communicate via the commenting feature on their own and also other group's Wiki page. This particular characteristic of Wiki was found to be suitable for collaborative learning process to happen. Result from quantitative findings found that a majority of learners, which were 74.3%, agreed and strongly agreed that they have learned a lot

from their group members and also from other groups in the Wiki during class activities and assignments.

The claim was further supported by qualitative findings where it was found that the social and collaborative affordances of Wiki allows the exchange or information to happen. This in turn enable learners to learn from each other to construct their knowledge. Wiki also has the ability to help foster collaboration efforts among students (Woo et al., 2011; Zorko, 2009). When collaborating using Wiki, students learn with each other and produces collective knowledge constructions instead of learning individually. Students can learn a lot by interacting with their peers and the interaction among students can further improve their writing ability.

Wiki also was found to heighten interactions among members. The evidence of positive perception can be found from the quantitative result analysis where a majority of learners, which were 67.9%, agreed and strongly agreed that they are excited to discuss about Wiki activities and assignments with their peers and course instructor. The finding is in line with the study by Zorko (2009), where it was found that Wiki enable to promote collaborative behaviours among students, such as learning from each other, as well as communicating with the course instructor. This shows that the feature in Wiki encourages communication between learners as well as the course instructor.

Students' expressed excitement is also related to students' motivational factor. When a person is highly motivated, there is a higher probability for them to engage in the task. This concurs with previous studies where Wiki were found to heightened group interaction among members (Franco, 2008; Li et al., 2010; Seet & Quek, 2010; Chong et al., 2011 & Woo et al., 2011).

Additionally, the learners find Wiki to be beneficial when they can examine examples from other group's Wiki page, which in turn could enhance their learning experience. This was based on the quantitative findings where a majority of learners, which were 63.3%, stated that they learn better when reading and examining examples from other groups' work in the class Wiki. This was further added by the positive perception evidence for interaction where it was also noted when 72.5% of the respondents positively stated that they like the use of Wiki during class session as it allows them to respond to, and share ideas with their peers and lecturers.

Interaction, be it with the course instructor or among group members is one of the most important aspects in collaborative learning. As found by the study conducted by Seet and Quek (2010), learners feel that when they experience the feel of teamwork, it would bring a richer learning experiences and discussions among group members where ideas as well as opinions which comes from a strong collaborative team would be actively produced.

In addition, an enthusiastic teacher, or course instructor with a sense of humour was an important factor in enhancing students' involvement, and addressing students by name and providing timely feedback were factors that made a positive contribution to interaction (Simonson et al., 2007). Other interactive behaviours that were found to contribute to students' involvement includes the use of a variety of questioning techniques which prompted students to participate more (Simonson et al., 2007).

On the whole, it was found that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of group interaction. This proved that Wiki is able to foster the spirit of teamwork among group members and heighted group interaction. The finding is in line with previous studies where it was found that Wiki is beneficial in facilitating group interaction (Kim et al., 2005; Woo et al., 2011).

When collaborating using Wiki, learners are able to learn from their peers by interacting among themselves, exchange ideas and views which in turn improves their writing ability and knowledge.

Palloff and Pratt (2010) suggested that web-based or online course instructors should continuously search for ways to improve students' interaction as it helps create more personal and relevant learning experiences, as well as to promote the development of active and engaged learners. This is because, online collaboration not only could help support students' learning, but it also could promote creativity and critical thinking (Palloff & Pratt, 2010). This is in line with the theory of constructivism where individuals learn through interaction with their world and they develop knowledge through social interaction rather than individual exploration (Fosnot & Perry, 1996).

Research Question 1(e). The research question was as follows:

How do students perceive the pedagogical benefit of Wiki in terms of motivation?

The evidence of positive perception towards Wiki in terms of confidence in writing was found when answering the Research Question 1(e), where the mean of the summed score of the Motivation subscale was 10.93 (score ranged between 3, denoting a "low perception" to 30, denoting "high perception" and mean score above 18 exhibits a positive perception).

The result found that learners positively perceived Wiki as a valuable tool in increasing their motivation. This finding validates previous findings in regards to Wiki's ability to increase learners' motivation (Basar & Yusop, 2014; Elgort et al.;

2008; Franco, 2008; Lee, 2010; Li et al., 2010; Li et al., 2012; Notari, 2006; Su & Beaumont, 2010; Yusop & Basar, 2014; Wichadee, 2013; Zorko, 2009).

Learning using Wiki is a good way to increase students' motivation because it shift away the concept of traditional teaching to a more interesting and interactive of learning. This was proven by the quantitative findings where a majority of learners, which were 55%, agreed and strongly agreed on that they preferred writing on Wiki more as compared to using the traditional pen and paper method. The claim was further supported by qualitative findings where Wiki was found to be a good way to provide motivation to students and increase their interest in learning.

It was also reported that using a technological tool and shifting away from the traditional concept of teaching and learning proved that it could increase students' interest and motivation to learn. This could be due to the novelty of new technology used in the classroom. The finding is in line with previous study where it was found that students perceived Wiki as beneficial in facilitating their motivation to write (Li et al., 2010).

Learners positively perceived Wiki as a valuable tool in increasing their interest in writing. This was proven by quantitative findings where a majority of learners, which were 51%, agreed and strongly agreed that their interest in writing improved when using Wiki for learning purposes. The claim was further supported by the qualitative findings where students made favourable comments such as "fun", "exciting", "great", and "enjoyed" to show their increased interest.

Excitement and increased interest are found to be positive indicators of motivation. The finding is in line with the study by Zorko (2009) where students became more interested in writing and improvements in their writing attitudes were found after engaging in collaborative writing when using Wiki.

The learners also positively stated, where a majority of learners, which were 68.8%, agreed and strongly agreed that the opportunity to post their work for others to review encouraged them to work harder and produce better quality work. This encouraged learners to produce better quality work and motivated them to put in more effort in their tasks, especially when they have the opportunity to post their work for others to review as well as when others reviewing their group's work.

On the whole, it was found that learners positively perceived Wiki as beneficial in facilitating their online collaboration in terms of motivation. The findings concurs with previous studies where learners perceive that online collaborative writing using Wiki was beneficial in facilitating their motivation in learning (Basar & Yusop, 2014; Elgort et al.; 2008; Franco, 2008; Lee, 2010; Li et al., 2010; Li et al., 2012; Notari, 2006; Su & Beaumont, 2010; Yusop & Basar, 2014; Wichadee, 2013; Zorko, 2009).

This shows that Wiki has the ability to provide students with a conducive online learning environment which could increase their motivation to learn. This finding is important for course instructors to help the course instructor in designing a course which is motivationally appealing in order to help the learners to be motivated to learn and participate.

Summary of discussion of research findings for Research Question 1. In summary, it was found that learners positively perceived Wiki as beneficial in five (5) major areas, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation. The findings were further supported by the statements from the qualitative analysis, which indicated that Wiki is beneficial in three (3) aspects, which were; (1) learning benefits; (2) collaboration benefits; and (3) technology advantages

However, one (1) negative theme, which is challenges, emerged from the qualitative findings. The challenges include a lack of access to the Internet, technology features and connection's slow bandwidth, which causes learners to be frustrated and bored. It is important for the course instructor to take into consideration of this issue because when learners are bored, frustrated, and dissatisfied, they more likely are at risk of quitting from their learning (Chyung, 2001).

These factors are inter-related with each other and it will affect the overall students' experience in using the web-based collaboration tool, which is Wiki. Additionally, it was also found that a majority of students, which were 70.6% stated that they planned to continue using Wiki again in the future for teaching and learning purposes. This is a positive indicator of students' intention to use Wiki which could be due to the pedagogical benefits that it brings.

Research Question 2. The second research question was as follows:

What is the relationship between the determinants (attitude, social influence, and perceived behavioural control) and students' behavioural intention towards the use of Wiki?

The second research question aimed to find out factors that are associated with students' intention to use Wiki. It was based on the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995), which aimed to investigate the factors that relate to students' intention to use Wiki for collaboration purposes based on three (3) variables. The variables were: (1) attitude (ATT); (2) social influence (SI); and (3) perceived behavioural control (PBC).

Attitude. Based on the findings from the quantitative data, it was found that all three factors, which were perceived usefulness (PU), ease of use (EU), and compatibility (COMP) were found to have significant positive relationship towards attitude (ATT). Result from the Pearson correlational analysis found that there is a significant positive relationship between perceived usefulness (PU), (r (109) = 0.728, p<0.01) and students' attitude (ATT) when using Wiki for collaboration purposes.

This finding is in line with previous studies where perceived usefulness (PU) was found to be one of the factors that determines attitude (ATT) towards the use of technology (Ajjan & Hartshorne, 2008; Buchanan et al., 2013; Sadaf, 2013; Shroff et al., 2011; Smarkola, 2007; Teo et al., 2007).

Perceived usefulness of technology tools are is driven by perceived values for improving student engagement, interaction, motivation, comprehension of content, and enhancing the overall learning experience by using innovative learning tools to which students can relate (Sadaf, 2013). Therefore, it is important for course

instructors to make students fully understand the importance and reason behind the technology integration in the classroom. This is to increase students' perception on the pedagogical benefits of Wiki when integrated with their learning.

When students have positive perceptions towards Wiki, there is a higher probability that they will adopt it for their learning purposes. This was further proven by the result from quantitative findings from Research Question 1, where students were found to have positive perceptions towards the usefulness of Wiki in terms of enhancing students' confidence in writing, knowledge sharing, improvement in writing, group interaction, and increasing motivation.

Next, result from the Pearson correlational analysis found that there is a significant positive relationship between ease of use (EU), (r (109) = 0.677, p<0.01) and students' attitude (ATT) when using Wiki for collaboration purposes. This finding is in line with previous studies where perceived ease of use was found to be one of the factors that determines student's attitude towards the use of technology (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Cheung & Vogel, 2013; Shroff, Deneen & Ng, 2011; Smarkola, 2007; Teo et al., 2007).

Students who perceived Wiki as easy to use are more likely to have a positive attitude towards it. On the other hand, students who perceived Wiki as difficult to use are unlikely to have a positive attitude towards it, and will be reluctant to use it. Therefore course instructors should adopt a technology which is suitable with the students' ability and skills. Course instructors also should choose a technology tool which does not require students to have an extensive technological background to use it.

In addition, it is important for course instructor to provide trainings and tutorials on how to use Wiki during the earlier stage of the semester prior to the start of the learning process. The reason behind this is to familiarize students and let them learn how to use it to avoid any negative perception on its ease of use. This is because a person's attitude towards the use of technology is influenced by how easy it is to use the tool and they will be reluctant to use it if it seem difficult to use.

The findings from the Pearson correlational analysis also found that there is a significant positive relationship between compatibility (COMP), (r (109) = 0.690, p<0.01) and students' attitude (ATT) when using Wiki for collaboration purposes. This finding is in line with previous studies where compatibility (COMP) was found to be one of the factors that determines student's attitude (ATT) towards the use of technology (Ajjan & Hartshorne; Sadaf, 2013; Taylor & Todd, 1995).

The quantitative findings from students' evaluation towards Wiki further supported the claim, where students are found to have a positive perception towards the compatibility of Wiki with their task and needs. From the quantitative findings, it was found that a majority of students, which were 73.4%, agreed and strongly agreed that the type and weight of class activities and assignments for this course were appropriate to be incorporated with Wiki. If the student think that Wiki is compatible with their learning needs, there is a higher probability that they have a positive attitude towards it.

Social influence. Both of the factors, which were peer influence (PI) and lecturer influence (LI) were found to have significant positive relationship towards social influence (SI) when using Wiki for collaboration purposes. Result from the Pearson correlational analysis found that there is a significant positive relationship between peer influence (PI), (r (109) = 0.838, p<0.01), and social influence (SI) when using Wiki for collaboration purposes.

The finding from this study is in line with previous study where peer influence (PI) was found to be one of the factors that determines social influence (SI) towards the use of technology (Ajjan & Hartshorne, 2008; Sadaf, 2013). However, the findings from this study differed from the findings by Cullen and Green (2011) where it was found that peer influence (PI) did not contribute to the adoption of technology.

Next, result from the Pearson correlational analysis found that there is a significant positive relationship between lecturer influence (LI), (r (109) = 0.864, p<0.01) and social influence (SI) when using Wiki for collaboration purposes. This finding is in line with previous study where lecturer influence (LI), or superior influence was found to be one of the factors that determines social influence (SI) towards the use of technology (Ajjan & Hartshorne, 2008; Sadaf, 2013).

This signifies that student's behaviour towards the use of Wiki was highly affected by their lecturer's influence or their superior's influence. Lecturers and course instructors who are more enthusiastic and have a positive attitude towards the particular technology tool that is used in the classroom may have a positive impact towards students' intention to use it for teaching and learning purposes. Therefore, it is important for lecturers and course instructors to constantly motivate and encourage students to use Wiki for their lesson to enhance their learning so that students have a more positive behaviour towards the use of Wiki.

Perceived behavioural control. All three (3) factors, which were self-efficacy (SE), technology facilitating condition (TFC), and resource facilitating condition (RFC) were found to have significant positive relationship towards perceived behavioural control (PBC) when using Wiki for collaboration purposes. Result from the Pearson correlational analysis found that there is a significant positive relationship between self-efficacy (SE), (r (109) = 0.716, p<0.01) and perceived behavioural control (PBC) when using Wiki for collaboration purposes.

This finding is in line with previous study where self-efficacy (SE) was found to be one of the factors that determines perceived behavioural control (PBC) towards the use of technology (Ajjan & Hartshorne, 2008; Buchanan et al., 2013; Cheon et al., 2012; Sadaf, 2013).

Cheon et al. (2012) suggested that it is important to instill confidence in students when using technology because it will lead to a greater likelihood of technology adoption. This is because students who are confident, and have higher level of self-efficacy towards Wiki tend to be inclined to use it more. On the other hand, students who are less confident, and have a lower level of self-efficacy towards Wiki tend to be reluctant to use it for their learning process.

Next, result from the Pearson correlational analysis found that there is a significant positive relationship between technology facilitating condition (TFC), (r (109) = 0.616, p<0.01) and perceived behavioural control (PBC) when using Wiki for collaboration purposes. This finding is in line with previous study where technology influence was found to be one of the factors that determines perceived behavioural control (*PBC*) towards the use of technology (Ajjan & Hartshorne, 2008).

Although Taylor and Todd (1995) suggested that the presence of facilitating resources may not, per se, encourage the use of technology, in this study, it did encourage the use of Wiki for a majority of students. However, it was also worth to take note that some students reported that technology issue that they faced when using Wiki represented barriers to their usage.

This claim was supported by the qualitative findings where the technological issues that the students faced during their Wiki usage could hinder their excitement and initiative to use Wiki. Some reported issues were the lock and steal feature, slow upload time due to poor Internet connection, and also no Internet connection outside of the classroom. This resulted in the lack of participation in the class Wiki by a number of students. This claim was further supported by Taylor and Todd (1995) where the absence of facilitating resources could represents barriers to usage and may inhibit the formation of intention and usage.

Result from the Pearson correlational analysis also found that there is a significant positive relationship between resource facilitating condition (RFC), (r (109) = 0.696, p<0.01) and perceived behavioural control (PBC) when using Wiki for collaboration purposes. The finding from this study is in line with previous study where facilitating resources was found to be one of the factors that determines perceived behavioural control towards the use of technology (Ajjan & Hartshorne, 2008).

Resources such as classroom environment that is fully-equipped with computers and Internet are some of the examples of facilitating resources. If a student feel that he or she does not have sufficient resource facilities for her to use Wiki, it may inhibit her effort to use Wiki. Therefore, it is crucial for course instructors to ensure that all the facilitating resources are present for the process of implementing

the use of web-based collaboration too, or Wiki, in the classroom so that the teaching and learning process can run smoothly.

Behavioural intention. To answer the second research question for this study, which is to find out which are among the three (3) factors (attitude (ATT), social influence (SI), and perceived behavioural control (PBC) that are related to students' intention (INT) to use Wiki for collaboration purposes, an inferential statistical analysis using Pearson correlation analysis was conducted.

From the statistical analysis, it was found that there is a significant correlation between attitude (ATT) and behavioural intention (INT) (r (109) = 0.793, p<0.01), towards the use of Wiki for collaboration purposes. The result is in line with past studies where it was found that attitude towards the use of technology is one of the important factors in predicting user's intention to adopt the use of technology in teaching and learning (Ajjan & Hartshorne, 2008; Cheung & Vogel; Davis, 1989; Teo et al., 2007; Sadaf et al., 2012; Sadaf, 2013).

Result from the statistical analysis also found that there is a significant relationship between social influence (SI) and behavioural intention (INT), (r (109) = 0.775, p<0.01) towards the use of Wiki for collaboration purposes. The result is in line with previous studies where is was found that social influence (SI), or subjective norm, is one of the important factors in predicting user's intention to adopt the use of technology in teaching and learning (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Cullen & Green, 2011; Taylor & Todd, 1995; Park et al., 2003; Teo et al, 2007).

Lastly, the result also found that there is a significant relationship between perceived behavioural control (PBC) and behavioural intention (INT), (r (109) = 0.591, p<0.01) towards the use of Wiki for collaboration purposes. The result concurred with previous studies where it was found that perceived behavioural control towards the use of technology is one of the important factors in predicting user's intention to adopt the use of technology in teaching and learning (Ajjan & Hartshorne, 2008; Cheon et al., 2012; Sadaf, 2013).

Therefore, all three (3) factors, which are attitude (ATT), social influence (SI), and perceived behavioural control (PBC) are found to be positively related with students' behavioural intention (INT) towards Wiki for collaboration purposes. The final validated model based on the findings of this study are shown in Figure 5.1 below.

The model was based on the proposed research model presented earlier in the study which was based on the Decomposed Theory of Planned Behaviour (DTPB) model by Taylor and Todd (1995) (refer Figure 2.2). Overall, all eleven (11) hypotheses were supported by the data, indicating that there is a positive relationship between all three factors, which are attitude (ATT), social influence (SI), and perceived behavioural control (PBC) with students' behavioural intention (INT) to use Wiki for collaboration purposes.

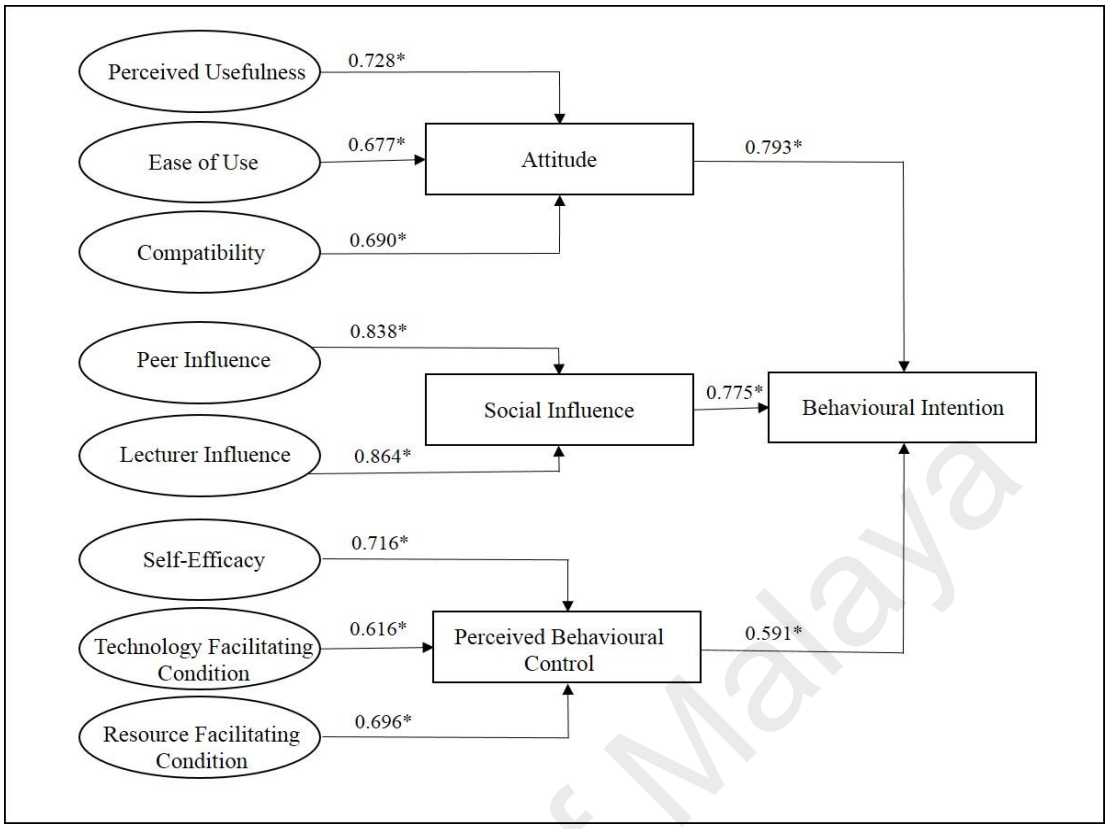

Figure 5.1. The final validated model of factors influencing students' intention to utilize a web-based collaboration tool for teaching and learning purposes

Note: *Significant at p <0.01

Research Question 3. The third research question was as follows:

Which of the factors (attitude, social influence, and perceived behavioural control) best predict students' intention to adopt Wiki in the future?

PLS-SEM statistical analysis method was conducted to find out which are among the three factors (attitude (ATT), social influence (SI), and perceived behavioural control (PBC)) that are the strongest determinant of students' behavioural intention (INT). Result from the PLS-SEM statistical analaysis found that student's attitude (ATT), (β=0.525), are the strongest contributing factor in explaining behavioural intention (INT).

Next, the second strongest contributing factor in explaining behavioural intention (INT) in using Wiki for collaboration purposes is social influence (SI), (β=0.377). Finally, perceived behavioural control (PBC), (β=-0.027*)*, was found to have very little negative importance on determining behavioural intention (INT). This insignificance effect may be due to the

The result of this study slightly differed from the previous finding by Sadaf et al. (2012) where it was found that all three variables, which are attitude (ATT), subjective norm or social influence (SI) and perceived behavioural control (PBC) are significant predictors of behavioural intention (INT). The findings of this study also slightly differed from Ajjan & Hartshone (2008) where they found that attitude (ATT) and perceived behavioural control (PBC) have strong positive influence of behavioural intention (INT), while subjective norm (SN) had no significant effect in explaining behavioural intention (INT).

However, the result from Sadaf et al. (2012) concurred with the findings of this study where it was found that attitude (ATT) makes the strongest contribution to determining behavioural intention (INT). The result also concurred with the previous findings by Ajjan and Hartshorne (2008) which also found that attitude (ATT) makes the strongest contribution in predicting behavioural intention (INT), followed by perceived behavioural control (PBC).

Based on the findings, course instructors should make an effort to increase students' attitude towards the use of web-based collaborative tool since it is the biggest contributing factor towards behavioural intention. Additionally, as social influence is also one of the factors which could influence students' intention to use the web-based collaboration tool, therefore, the course instructor should inform the students the importance and advantages of utilizing the tool for their learning process.

Through the application of the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995) in this present study allows the prediction of factors that influences students' intention to use the web-based collaboration tool for teaching and learning purposes. In addition, it also provides a fuller understanding of behavioural intention and allows course instructors the guidance and a more in-depth insight on which factors that are stronger in predicting students' intention to use Wiki for collaboration purposes in their learning process.

Implications of Research

The findings from this study is seen to have several implications to various parties, namely to the theoretical knowledge, students, course instructors and instructional designers, as well as policy makers.

Theoretical implications. The findings of this study is useful in predicting factors influencing students' intention to use Wiki for their learning using the Decomposed Theory of Planned Behaviour (DTPB) as a base for the conceptual framework that guided this study. The findings of this present study provide an additional insight and a deeper understanding of students' intention to utilize Wiki for collaborative learning and the factors that best predict students' intention.

The findings for overall model showed that it has a good predictive power and accuracy. In this study, the strength of students' attitude as the strongest predictor in explaining the variance is similar with previous Decomposed Theory of Planned Behaviour studies. This further contributed to the validation of the variables involved in explaining the model. This proves that the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995) is useful to be used in a variety of contexts and

settings as it allows an in-depth insight in understanding the variables involved in behavioural intention.

Implications to students. This study investigated the use of Wiki for collaboration purposes to supplement in-class learning from the perspectives of the learners. According to Ames (1992), it is important to attend to learners' perceptions because it could predict and explain about their motivation, affect and behaviour regarding their classroom experiences. This is because, it is important to learn about the learners' needs and put it into utmost consideration when planning an instructional strategy that incorporated the use of technology. By researching on the issues related to perceptions and intentions to use Wiki, this study will give an in-depth insight into designing a conducive Wiki-based learning experience according to students' preference and their own point of view.

When looking at the learners' view, it could provide an insight to the possible gaps in the pedagogical and technological aspects of the learning environment and inform the instructor on areas that could be improved (Seet, & Quek, 2010). Through this, it was hoped that students are more inclined to use Wiki for their learning purposes due to the various possibilities it can offer which could enhance their learning process. With regards to practice implications, the findings from this study shows students' autonomy plays an important role in determining their intention to utilize the use of web-based collaboration tool for their learning process.

In addition, students can be more informed and prepared to change their mindset towards a new style of learning, which shifts away from the traditional method whereby teachers are the source of knowledge provider. Instead, the new form of learning requires students to be more active in their learning by building their own

materials and knowledge by interacting with others and their environment. Students need to be more equipped with not only critical and creative thinking skills, but they also need to be prepared with various Information and Communication Technology (ICT) skills. This can be further achieved by continuous training and involvement with the technology that is being integrated into the lesson.

For example, using the web-based collaboration tool, such as Wiki in the classroom continuously for a longer period of time, which is more than one semester of learning. This helps students to familiarize with the web-based collaboration tool better and as they are more involved with the tool, they would feel more comfortable in using it, and therefore have better intention in the tool adoption for their learning process.

Implications to course instructors and instructional designers. The findings of this study is helpful for future course instructor as well as instructional designer in designing an effective online learning course structure using Wiki as the issues discussed were related to each other and will affect the overall quality of the course as a whole. This is because, they are the important drivers who plays an important role in the implementation of technology in the class.

The findings from this study also could provide an insight for the way a course is designed and conducted. Thus, it is imperative for course instructors to design and create a constructivist and motivating learning environment which not only could help promote learners in achieving knowledge beyond cognitive, but also could help improve other skills such as communication, teamwork, thinking skills, and creativity in finding ideas and solutions. This is because, ultimately, the key to the success in the

implementation of web-based learning environment in the classroom is not which technology are used, but how they are used when it is incorporated with lesson.

The course instructor should put into utmost consideration in the way the course designed, organized and how the learning material is delivered when incorporated with technology. Additionally, the course instructor need to take into consideration of other important aspects such as learner characteristics and profile. Although some educators may view technology as a classroom cure-all, it is important to note that computers and other technology do not automatically make teachers more capable. However, they need to be versed in best practices for integrating technology into the curriculum (Smaldino et al., 2012).

As stated by Clark (1983), the media are mere vehicles that deliver instruction but do not influence student achievement, but only the content of the vehicle can influence achievement (as cited in Simonson et al., 2007). Therefore teachers need to revise their traditional instructional strategies to suit the new instructional method which incorporated the use of technology in their lesson. One of the ways is to plan online activities that allows students to work in a group, or collaboratively as this helps construct a supportive and interactive social environment (Simonson et al., 2007).

It is also important for course instructors to keep in mind that technology alone does not promote learning. However, it should instead run parallel with the pedagogy, or what can be called as pedagogically-driven instructional design. As stated by Rosenberg (2004), “in e-learning it is important to lead with strategy instead with technology which is really a mistake.”

As stated by Clark (1983), the media are mere vehicles that deliver instruction but do not influence student achievement, but only the content of the vehicle can influence achievement (as cited in Simonson et al., 2007). Therefore teachers need to

revise their traditional instructional strategies to suit the new instructional method which incorporated the use of technology in their lesson. One of the ways is to plan online activities that allows students to work in a group, or collaboratively as this helps construct a supportive and interactive social environment (Simonson et al., 2007).

A good quality web-based or online course should include pedagogical richness, use of media, interactivity with content, testing and feedback, and collaboration (Sonwalkar, 2002, as cited in Deubel, 2003). On the other hand, a well-designed course in turn would keep learners engaged and motivated throughout the learning process.

This study will also provide course designers of the elements that could encourage or hinder students' participation in the class activities when using a web-based collaboration tool, particularly Wiki. Therefore, it is important for instructors to create a conducive online learning environment not only to cater for individualized learning, but also for collaborative learning experience (Yusop & Basar, 2014). This is because a course, which is designed effectively by integrating both aspects of technology and pedagogy, has the ability to facilitate and enhance the students' learning process. However, it is important for course instructors to identify and put forth the learners' needs as well as pedagogical needs first instead of what technology should be used in order to help achieve the intended learning outcomes.

Implications to policy-makers. The study could give an insight to policy-makers on the pedagogical benefits and issues regarding the integration of web-based collaboration tool to supplement teaching and learning. The policy-makers could develop an appropriate guidelines or revise existing institutional policies in regards to the implementation of web-based collaboration tool in instructional practices. Learning courses could be reinvented and revised to integrate and promote the use of technology in classroom practices. This is to help in practicing effective implementation of blended-learning course.

In addition, schools and classes need to be equipped with the needed facilitating resources, such as computers and the Internet so that the use of web-based technology can be successfully implemented. Therefore, it is important for the policy-makers and the Ministry of Education to provide tools and connectivity to all educational institutions to avoid the issue of digital divide, especially those who are in the rural areas. In addition, for schools or higher educational institutions that are already equipped with Information and Communication Technology (ICT) infrastructure and tools, they need to ensure that all of these equipments are updated and well-maintained. This is to ensure the smoothness of the Information and Communication Technology ICT integration process in teaching and learning.

In addition, the initiative from policy-makers can also include preparing guidelines for qualification of course instructors when teaching in blended-learning courses. Information and Communication Technology (ICT) training for course instructors in educational institutions, be it in primary schools or universities, can be done so that they are more equipped with the needed skills to implement technology in the classroom.

This is because, the successful implementation of Information and Communication Technology (ICT) in teaching and learning is not only focused on the technology tool alone. According to Alias Daud et al. (2003), the recipe for Information and Communication Technology (ICT) success in education include staff development, new job design, new course design, changes in roles and rewards, and also new organizational partnership.

The training can also help course instructors to cope with the changes of skills and knowledge that they need in order to successfully implement the integration of technology in their teaching and learning process. This is due to the extra Information and Communication Technology (ICT) skills and knowledge needed for course instructors in addition to the pedagogical skills when implementing web-based collaboration tool in the classroom.

According to Wong, Teo and Russo (2011), the success of integrating technology in teaching and learning depends strongly upon the engagement of the course instructors, and having those who are competent in using and managing educational technology is important. This shows the importance of ensuring course instructors to be equipped with various Information and Communication Technology (ICT) skills so that they are not only comfortable, but also capable in using technologies in the classroom.

It is hoped that through this study, the use of web-based collaboration tool in the educational field, especially in Malaysia can be expanded. It is also hoped that through this studies the concerns, especially among students, course instructors and instructional designers, as well as policy makers in implementing the use of web-based collaboration tool in their instruction can be diminished.

This implication is in-line with the transformation shift in the Malaysian education system according to the Malaysian Education Blueprint. The Malaysian Education Blueprint 2013-2025, which is the master plan for education sector development in Malaysia, affirms the efforts in leveraging Information and Communication Technology (ICT) to scale up the quality of learning across Malaysia (Ministry of Education Malaysia, 2015a).

In addition, it is also hoped that this could motivate them to move away from the traditional way of delivering courses to using web-based collaboration tool to supplement the teaching and learning process. Transforming the educational system will entail changing the culture and practices, which means moving away from the traditional memory-based learning to an education that stimulates thinking, creativity, caters to individual abilities and learning styles, and based on a more equitable access (Ismail, n.d.).

Such initiative can include formalizing the use of Information and Communication Technology (ICT) in educational institutions. This is due to the vast possibilities and opportunities that these tools could offer in promoting the teaching and learning process. Moreover, the policy-makers are in the position to bring out the positive changes in the implementation of Information and Communication Technology (ICT) in educational institutions.

Recommendations for Future Study

Based on the findings and limitations of this study, there are a few recommendations that can be taken for future studies. First, this study was carried out in a small and limited scale, where the respondents were limited to only undergraduates participating in one blended-learning course in a public university in Malaysia.

Therefore, the generalizability of this research is limited to undergraduates participating in similar learning setting and course structure.

It is suggested that future studies to be conducted to reach a wider context and scopes. For instance, a further study can be conducted to include a larger variety of respondents from different courses in the university, such as learners from different faculties and courses, so that the scope of study is wider and more informative to the researcher in order to generalize results to a larger population.

Additionally, this study implemented the use of only one type of Wiki, which is PBworks (www.pbworks.com). PBworks may have its own characteristics and features unique to it. Thefore the advantages and disadvantages of this particular Wiki which may differ from other available Wikis on the web. Therefore, it is suggested that the objectives of this study are replicated and a future study is carried out implementing a different type of Wiki available online, such as Wikispaces or TikiWiki.

Next, it is also recommended that a future long-term study to be conducted to further understand whether students' intention to use the web-based collaboration tool for teaching and learning purposes are transferred into actual usage. This might be an interesting study to learn whether students' intention are truly related with their actual use of web-based collaboration tool. Therefore, it would be beneficial to track the same participants and conduct a longitudinal study on whether they translate their intention into action in using Wiki in the future for their learning purposes.

Furthermore, it is also recommended that the use of web-based collaboration tool, or Wiki, in the classroom are implemented for a few semesters instead of just one semester. This is to familiarize students and make them more comfortable in using the tool for their learning. It is also interesting to study the long-term effect of using the

web-based collaboration tool for the students' learning. It is also beneficial to find out whether there are differences in students' perceptions and also intention in using the web-based collaboration tool in the long run.

Conclusion

This study investigated students' perception in regards to the pedagogical benefits of an online collaboration tool, namely Wiki, when integrated in the classroom for teaching and learning purposes. The result suggested that the learners positively perceived Wiki as beneficial in five (5) terms, which are: (1) confidence in writing; (2) knowledge sharing; (3) improvement in writing; (4) group interaction; and (5) motivation. The findings were further supported by analyses of qualitative findings where four themes emerged in regards to the integration of web-based collaboration tool in the teaching and learning process. The four themes are: (1) learning benefits; (2) collaboration benefits; (3) technology advantages; and (4) challenges.

Additionally, this study also seek to find out the factors that influence students' intention to adopt Wiki for teaching and learning purposes. Using the Decomposed Theory of Planned Behaviour by Taylor and Todd (1995), it was found that there is a significant positive relationships between all three factors, which are attitude, social influence, and perceived behavioural control with students' behavioural intention towards the use of Wiki. Among these three factors, students' attitude was found to be the highest significant predictor in determining students' intention to adopt Wiki for their teaching and learning purposes.

The findings from this study was limited to one particular course in one public university, thus the findings could not be generalized to represent the entire learners or population due to the small sample size. Even though the results could not be generalized, the researcher hoped that the findings will be helpful for future course instructor as well as instructional designers in designing an effective blended learning course which employs collaborative learning technique, particularly Wiki. The findings from this study also highlight the critical importance for nurturing positive attitude and creating a stimulating social environment for students to adopt the use of web-based collaborative tool, or Wiki, in the future for teaching and learning purposes.

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