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STUDENT ADOPTION OF FACEBOOK PRIVATE GROUPS FOR MOBILE LEARNING IN HONG KONG

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A thesis submitted in partial fulfilment of the
requirements of London South Bank University
for the degree of Doctor of Business Administration

September 2018

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Abstract

Mobile learning using Facebook is increasingly used by faculty in universities to improve student engagement. This study examines the determinants influencing students' acceptance of Facebook for mobile learning. Seven determinants were identified in past literature, including: performance expectancy, effort expectancy, device usability, hedonic motivation, habit, social presence and interactive learning. A research model was developed in order to explain students' behavioral intention to use Facebook private study groups for mobile learning. The model was empirically tested using the survey data collected from students (N=123) of a marketing course taught using mobile learning in a classroom setting. It was followed by focus group interviews for triangulation and further exploration based on student feedback and comments. Research findings confirmed that all seven determinants had significant positive associations with the behavioral intention to use Facebook private study groups for mobile learning. Hedonic motivation had the most significant positive association with the students' behavioral intention. In addition, it was found that social norms played an important role in influencing student use behavior. The findings of this research provide insights into (1) the theory and practice in the successful implementation of mobile learning using Facebook, (2) blended pedagogical strategies in confronting the continuous technology innovation and changing learning preferences of a new generation of students and (3) management strategies in mobile learning.

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Glossary

Mobile learning	“The delivery of learning to students anytime and anywhere through the use of wireless internet and mobile devices, including mobile phones, personal digital assistants (PDAs), smartphones and digital audio players (Wang, Wu & Wang, 2009:93)”
Performance expectancy	"The degree to which using a technology will provide benefits to consumers in performing certain activities (Venkatesh, Thong & Xu, 2012:159)"
Effort expectancy	"The degree of ease associated with consumers' use of the system (Venkatesh, Thong & Xu, 2012:159)".
Hedonic motivation	"The fun or pleasure derived from using a technology (Venkatesh, Thong & Xu, 2012:161)".
Habit	"The extent to which people tend to perform behaviors automatically because of learning (Venkatesh, Thong & Xu, 2012:161)".
Device usability	A collective concept of effectiveness, efficiency, satisfaction, security and ease of learning (Abran et al., 2003)
Interactive learning	Interactive learning refers to a teaching and learning approach that makes use of information and communication technology into course design and delivery (Revees & Revees, 1997; Johnson et al., 2000).
Social presence	“The degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships (Short, Williams, & Christie, 1976).”
Behavioral intention	“Behavioral intention is an immediate antecedent of behavior and indication that an individual is ready to perform the behavior (Ajzen, 1991).”

Dedication

To my beloved wife, Wong Chit Wah, whose sacrificial care for me and our daughter made it possible for me to complete this work, and to our daughter, Lam Cheuk Ki, who was diligent in her study to support me.

To my brother, Lam Chun, who financially supported my DBA study and provided me research advice.

Acknowledgements

I would like to express my gratitude to my London South Bank University supervisors, Professor Jon Warwick and Dr. Ronnie Cheung for their dedicated and kindest support in terms of providing useful comments, sharing research experience and giving valuable advice on my thesis throughout my DBA study. Their guidance has helped me overcome numerous hurdles and difficulties in my DBA research. Without their continuous support and motivation, I am absolutely sure I could not have completed this thesis and finished my DBA studies.

I am thankful to all LSBU professors and local tutors, especially, Professor Shushma Patel, for their teaching and professional knowledge sharing, so that I can improve my skill and knowledge in research.

I am grateful to the LSBU Research Committee for their valuable feedback in my research ethnical application and progress reports so that I can improve my research study and thesis.

I would like to thank my brother, Dr. Lam Chun, for his financial support and encouragement. I would like to thank my wife, Wong Chit Wah; and my daughter, Lam Cheuk Ki, for their understanding, support and patience.

I would like to express my gratitude to all the staff of the International Academy of Management (IAM), especially, Dr. Joseph Leung, Ms. Karen Keung and Mr. Sunny Yee, for the continuous encouragement, help and support so that my DBA studies can progress smoothly.

Furthermore, I would like to thank all my DBA classmates, especially, Gilman Tam, Samson Yeung, Coleman Ng, Tony Lam, Vincent Fong and Johnson, for their continuous encouragement and support. I would like to thank Ms. Pippa to do the proofreading for me.

Louis LAM

LONDON SOUTH BANK UNIVERSITY

THESIS DECLARATION

Statement of Originality and Compliance of Academic Ethics

I, LAM LUI, hereby declare that the thesis titled 'Student adoption of Facebook private groups for mobile learning in Hong Kong' has been undertaken by me for the award of Doctor of Business Administration. I hereby confirm that the thesis I am submitting is an original and authentic piece of work written by myself that satisfies the University rules and regulations with respect to Plagiarism and Collusion. I confirm that the information in this thesis has been obtained and presented in accordance with academic rules and ethical conduct. I further confirm that all the materials incorporated in this thesis as secondary resources have been fully referenced and acknowledged in accordance with the Harvard system.

Moreover, I certify that I have taken a copy of the thesis, which I will retain until after the Board of Examiners has published the results,

Name: LAM LUI

Student number: 3206212

Date:

Signed:

Please note that the thesis will not be assessed without the inclusion of this declaration by the student.

Supervisor signature: _____
Professor Jon Warwick

Date: _____

Supervisor signature: _____
Dr. Ronnie Cheung

Date: _____

Preface

This thesis is my final work in partial fulfillment of the requirements of London South Bank University for the degree of Doctor of Business Administration (DBA) titled “Student adoption of Facebook private groups for mobile learning in Hong Kong”. This thesis describes the results of my DBA study from April 2013 until June 2018. The study was conducted in the School of Continuing and Professional Studies, The Chinese University of Hong Kong, in order to investigate the determinants influencing students’ behavioral intention to use Facebook private groups for mobile learning in Hong Kong. This study originated from the challenge of how to improve student learning engagement through better interaction, communication, collaboration and motivation. One possible pedagogical strategy is the integration of information technology where social media and smartphones are the two most popular technologies that have education potential to be integrated to facilitate student learning. However, understanding students’ adoption of these technologies is crucial to successful integration and implementation.

There are several contributions from this study, including (a) the examination of determinants of the research model which explains the students’ adoption of Facebook private groups for mobile learning in Hong Kong; (b) the exploration of student feedback on factors affecting their user behavior; and (c) the provision of information about future blended pedagogical strategies in confronting the continuous technology innovation and changing learning preferences of a new generation of students.

1 Introduction

This chapter introduces (1) Context of the study, (2) Importance of the study, (3) Contribution of the study, (4) Research question, aim and objectives, and (5) Outline of the thesis.

1.1 Context of the study

1.1.1 Students' engagement on smartphone and social media

The increasing popularity and penetration Internet and smartphone worldwide have created enormous educational opportunities in higher education. It is because the continuous growth in the global adoption and usage of Internet and mobile technologies has changed student's learning behavior. This can be evidenced from the recent survey reports from Pearson and Pew Research Center. The Pearson (2015) Mobile Device Survey on national college students reports that 85% higher education students own a smartphone, 52% students own a tablet and 10% students own a hybrid or 2-in-1 computer. In terms of school work, major of students (87%) use notebook whereas 64% of students use a smartphone and 40% students use a tablet. In terms of future preference, 40% students prefer more school work can be done on tablet device, whereas 39% students prefer using smartphone to do school work and 22% students prefer to use large smartphone for school work (Pearson, 2015). Besides, Pew Research Center (2015a) survey on eleven countries smartphone ownership and internet reports that the percentages of adult Internet users between advanced economies and developing economies are 87% and 54% respectively whereas smartphone ownership are 68% and 37% respectively.

Furthermore, Pew Research Center (2015a) US survey on smartphone use reports that 91% of young adults (age 18 to 29) use their smartphone for social networking. Furthermore, Pew Research Center (2015a) US survey on social media usage reports that 90% of young adults use heavily on social media where 82% of them use Facebook. Another Pew Research Centre (2015a) US survey on Teens, Social Media & Technology Overview reports that due to the popularity of smartphone, about 75% of teens (age 13 to 17), who will be higher education students, have access to smartphone at least once and 30% have basic phones whereas 12% have no cell phones. In terms of usage, 92% of teens go online daily inside which 24% report almost going constantly, 56% report going several times a daily, 12% report going once a day and 6% report going weekly (Pew Research Center, 2015a-e).

Social media is an umbrella term describing social networking site, micro-blogging, file and photo sharing and video sharing (Warren, 2018). Research shows that new generation of students has spent more time on instant messaging, online game, photo and video sharing, watching online videos, reading and posting blogs, and social communication than studying (Clark et al., 2009; Hossain & Quinn, 2013). Increasingly, students become more engaged with their smartphone and social media. The phenomenon can be explained by Prensky (2001) that new generation of students are 'Digital natives' who prone to use technologies in their daily life. Besides, Traxler (2007) believed:

“Mobile, personal and wireless devices are now radically transforming societal notions of discourse and knowledge, and are responsible for new forms of art, employment, language, commerce, deprivation, and crime, as well as learning. Traxler (2007:2)”

As generation's engagement in smartphone and social media is growing significantly, scholars are interested in uncovering the educational potential of using social media for mobile learning. Lewis, Pea & Rosen (2010) found that mobile learning using social media can mediate social interaction and foster the learning communities. Besides, social media nowadays are built using Web 2.0 technologies which provide an excellent collaborative environment for teaching and learning (Hossain & Quinn, 2013). Besides, mobile learning using social media could give learning instructions inside or outside classrooms which could keep students more engaged in learning (Schroede & Haskell, 2011).

1.1.2 The adoption of social media for mobile learning

Among four types of social media, social networking site, for example Facebook, is commonly used by faculty and teacher for mobile learning. It is because Facebook is still the most popular social media nowadays where most of the students have been using it for years (Escobar-Rodriguez, Carvajal-Trujillo & Monge-Lozano, 2014). Facebook is built using Web 2.0 technologies which support collaboration, communication and interaction. Besides, it has features including (1) private group, (2) message wall, (3) instant messaging, (4) file, audio, video sharing, etc. Furthermore, it has mobile application available for download (Park, 2011). Mobile Facebook is complimentary to the learning management system provided by universities because mobile Facebook can offer the opportunities for communication, interaction, dissemination of learning content, engaging student and motivation (Gabarre et al., 2013; Li & Chen, 2014). Mobile learning encourages formal and informal learning within and out of classroom respectively (Khaddage, Müller & Flintoff, 2016). Though students tend to be open-minded about using Facebook in education, Facebook is a social network site for social interaction and communication rather than educational purposes (Escobar-Rodriguez,

Carvajal-Trujillo & Monge-Lozano, 2014). The use of Facebook for teaching and learning as well as using mobile Facebook for mobile learning is based on the assumptions that the features of Facebook are useful and can be integrated with learning environment (Manca & Ranieri, 2016). Therefore, in order for Facebook for mobile learning to succeed in universities, it is necessary to understand what factors students consider to be important in the adoption of Facebook for mobile learning (Sánchez, Cortijo & Javed, 2014). Despite the extensive literature about the acceptance of information technologies, few studies have been conducted in social media and mobile technologies in education, specifically, the adoption of Facebook for mobile learning.

1.2 Importance of the study

Mobile learning using Facebook is becoming common in education. The researcher, being a lecturer in a higher education institution, is interested in uncovering the educational potential of mobile learning using Facebook, and how it can be implemented successfully so as to improve student engagement in learning. Therefore, the research questions are (1) What are the determinants influencing students' adoption of Facebook private study groups for mobile learning within higher education in Hong Kong? (2) Are there any gender or age differences in adoption of Facebook private study groups for mobile learning? (3) Is there any additional determinant that is important to student adoption of Facebook private study groups for mobile learning? (4) Why do students use Facebook? (5) Why do students use smartphone? (6) What are the advantages and concerns of using Facebook for mobile learning? In this study, the researcher attempts to investigate factors driving students' adoption of Facebook private study groups for mobile learning and examine whether it is worth investing in mobile learning technology.

This study aims to investigate the determinants influencing the students' adoption of Facebook private study groups for mobile learning. The determinants are identified based on the past literature. If the determinants are found to be significantly associated with the behavioral intention to use Facebook private study groups for mobile learning, and subsequently to retain students by improving their learning experience, it is justified for colleges or universities to consider the investment in mobile learning technology instead of using free social media technology.

The concept of mobile learning and Facebook are discussed in the literature review section. A mixed research method was employed containing quantitative and qualitative research methods. The questionnaire was developed based on past literature survey instruments and an online survey was conducted to collect student responses about mobile learning using Facebook private study groups. Focus group interviews were carried out to collect students' opinions about mobile learning using Facebook.

1.3 Contribution of research

This research has a number of intended contributions. Firstly, it addresses the gap in research into students' adoption of Facebook study groups for mobile learning in universities. Secondly, the researcher examines the critical technology adoption determinants which are identified in past literature, including habit, performance expectancy, effort expectancy, hedonic motivation, device usability, interactive learning and social presence. Research has shown these determinants have significant associations with behavioral intention and verified empirically the relationships as evidenced in the past literature. Thirdly, the research contributes to the body of literature about the blended teaching and learning using Facebook and smartphones in order to facilitate student learning. Therefore, this research contributes a research model which explains students' adoption of Facebook private groups for mobile learning in Hong Kong. Fourthly, the researcher carries out focus group interviews of students in order to explore their attitudes towards using Facebook for mobile learning. Fifthly, the findings help to clarify the concerns of some researchers about the appropriateness of using social network sites for learning purpose (O'Keeffe & Clarke-Pearson, 2011). Finally, this research discusses (1) business opportunities of mobile learning in higher education in Hong Kong, (2) future challenges due to continuous technology innovation and new generations of students, (3) future pedagogical strategies in blended learning, and (4) future management strategies.

As stated in the above intended contributions, there are some questions that are worth considering. Is mobile learning necessary for colleges and universities (Cheon, Crooks & Song, 2012)? Do these seven determinants contribute to the successful implementation of using Facebook for mobile learning (Wang, Wu & Wang, 2009)?

Can mobile learning using Facebook be generalized in higher education globally (Bosch, 2009)? How does mobile learning contribute to the improvement of the student engagement in learning (Heflin, Shewmaker & Nguyen, 2017)? These questions are addressed in the discussion and conclusion sections.

1.4 Research question, aim and objectives

As discussed above, the increasing importance of mobile learning and its education potential in higher education in Hong Kong, it is important to understand what drives students' acceptance of Facebook, smartphone and the adoption of these technologies in mobile learning. Therefore, the research questions, aims and objectives of this study are stated as follows.

1.4.1 Research questions

Question	
1	What are the determinants influencing students' adoption of Facebook private study groups for mobile learning within higher education in Hong Kong?
2	Are there any gender or age differences in adoption of Facebook private study groups for mobile learning?
3	Is there any additional determinant that is important to student adoption of Facebook private study groups for mobile learning?
4	Why do students use Facebook?
5	Why do students use smartphone?
6	What are the advantages and concerns of using Facebook for mobile learning?

1.4.2 Research aim

It is generally believed that a blended approach using Facebook and smartphones for mobile learning would provide benefits to students. However, it is important to

understand what affects students' acceptance of Facebook private study groups for mobile learning. Therefore, the research aims are:

Research question	Research aim
1	To examine how the determinants influence students' adoption of Facebook private study groups for mobile learning.
2	To assess if, how and why do age and gender differences exist.
3	To explore if there is any additional determinant mentioned by students and why it is important to them.
4	To explore the reasons why students use Facebook.
5	To explore the reasons why students use smartphone.
6	To explore the advantages and concerns of using Facebook for mobile learning

1.4.3 Research objectives

Prior literature has shown performance expectancy, effort expectancy, habit and hedonic motivation are significant predictors to behavioral intention to use certain technology (Venkatesh, Thong & Xu, 2012). However, it is uncertain if these predictors have the same significance in mobile learning using Facebook. Besides, smartphones have features of device usability and interactive learning in mobile learning (Koole, 2009) whereas Facebook is characterized by social presence (Short et al., 1976). It is unclear if device usability, interactive learning and social presence could exhibit prediction power as to behavioral intention to use Facebook for mobile learning. Thus, the researcher attempts to investigate these relationships in the context of higher education in Hong Kong. Therefore, the research objectives are devised as follows:

- To investigate the relationship between behavioral intention and the determinants, i.e., performance expectancy, effort expectancy, habit, hedonic motivation, social presence, device usability, and interactive learning.

- To test the hypotheses
 - H1: Performance expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
 - H2: Effort expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
 - H3: Hedonic motivation will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
 - H4: Habit will be positively associated with actual use of Facebook private groups for mobile learning.
 - H5: Device usability will be positively associated with actual use of Facebook private groups for mobile learning.
 - H6: Interactive learning will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
 - H7: Social presence will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
- To investigate the age differences.
- To investigate the gender differences.
- To explore other factors based on students' opinions towards Facebook private study groups for mobile learning.
- To explore the reasons based on students' opinions towards using Facebook.
- To explore the reasons based on students' opinions towards using Smartphone.
- To explore the advantages and concerns of Facebook for mobile learning based on students' opinions.

These allow the researcher to make recommendations about the (1) business opportunities of mobile learning in higher education in Hong Kong, (2) future challenges due to continuous technology innovation and new generations of students, (3) future pedagogical strategies in blended learning, and (4) future management strategies.

In this study, mixed research methods are used, including quantitative and qualitative research. Online surveys and focus group interviews are designed to collect data from students after a 15-week semester using their smartphones for Facebook private study groups for learning activities. In quantitative research, this study makes use of factor analysis and multiple linear regression analysis in order to validate the collected online survey data and test the hypotheses of the research model. A non-parametric test is used to examine the existence of age and gender differences. In qualitative research, students' opinions were collected using focus group interviews and analyzed by content analysis for triangulation and further exploration.

To summarize, the higher education market in Hong Kong is growing quickly with new self-financed colleges and private universities which offer various courses for local and overseas students. The rapid proliferation of social media and mobile technology has created enormous education and business opportunities for higher education institutions to promote mobile learning in order to improve student engagement in learning.. This also helps the institutions to position and differentiate themselves in the higher education market. Therefore, a theoretical research framework is developed based on a case study of mobile learning using Facebook in SCS.

1.5 Outline of the thesis

The structure of the thesis is organized as follows. Chapter 1 is an introduction which provides an overview of the study including (1) context of the study, (2) importance of the study, (3) contribution of research, (4) research questions, aims, and objectives. Chapter 2 is literature reviews, which reviews major theories etc. Chapter 3 covers literature synthesis and generation of hypotheses based on the variables including behavioral intention, performance expectancy, effort expectancy, hedonic motivation, habit, social presence, device usability and interactive learning. Chapter 4 discusses the research methodology. The quantitative and qualitative data collection and analysis are respectively discussed in Chapters 5 and 6. Chapter 7 is a discussion of findings from the data analysis. Chapter 8 shows the conclusions, recommendations,

research limitations and future research direction. Finally, the references and appendices are stated in Chapters 9 and 10 respectively.

1.6 Research outputs by researcher

This section lists conference and journal papers published by the researcher during the LSBU DBA study. The findings of the research papers help support this research study.

- Lam, L., & Ng, F. (2015, July). A Comparison Study of Student Acceptance of Social Network Services and Mobile Technologies in Hybrid Learning. In *International Conference on Hybrid Learning and Continuing Education* (pp. 334-345). Springer International Publishing.
- Lam, L. (2015, July). A Qualitative Study to Understand the Factors Influencing Student Acceptance of Mobile Learning. In *Educational Technology (ISET), 2015 International Symposium on* (pp. 158-162). IEEE.
- L. Lam, & R Cheung (2013). An Empirical Investigation into the Factors Influencing the Adoption of a Social and Collaborative Learning Environment. Official Conference Proceedings 2013, The Asian Business and Management Conference 2013.
- Lam, L., Lau, N. S., & Ngan, L. C. (2013). An Investigation of the Factors Influencing Student Learning Motivation with the Facilitation of Cloud Computing in Higher Education Context of Hong Kong. *Hybrid Learning: Theory, Application and Practice*, 12, 13.
- Lam, L. (2012). An Innovative Research on the Usage of Facebook in the Higher Education Context of Hong Kong. *Electronic Journal of E-learning*, 10(4), 378-386.
- Lam, L. (2012, June). An Investigation of the Factors Influencing Student Engagement in Learning Through Using Facebook as Part of Online Learning Platform. In *International Conference on e-Learning* (p. 211). Academic Conferences International Limited.
- Lau, N. S., & Lam, L. (2012, August). An investigation of the determinants influencing student learning motivation via Facebook private group in teaching and learning. In *International Conference on Hybrid Learning* (pp. 35-44). Springer Berlin Heidelberg.

2 Literature review

This chapter reviews past literature that is relevant to this research study. This includes (a) introduction, (b) mobile learning, (c) social network sites, (d) students' adoption of Facebook for mobile learning, and (e) research gaps. In the introduction section, the researcher explains how mobile learning is conceptualized and mentions the mobile learning practices in higher education in Hong Kong. In the section on mobile learning, the researcher (1) explains the definitions of mobile learning; (2) highlights the benefits of mobile learning; (3) explains how mobile learning is important to student engagement and (4) addresses the concerns about mobile learning. In the section on social networking sites, the researcher (1) explains what a social networking site is; (2) highlights the benefits of mobile learning using Facebook and (3) addresses the concerns about using Facebook for learning. In the section on students' adoption of Facebook for mobile learning, the researcher (1) explains the reasons for understanding students' adoption of Facebook for mobile learning; (2) reviews the factors influencing students' adoption of (i) mobile learning, and (ii) Facebook; (3) reviews seven important factors identified for the empirical studies of relationships with behavioral intention. Finally, the researcher sums up the discussion of literature review, explains the choice of seven determinants and explains the research gaps.

2.1 Introduction

The idea of mobile learning was introduced about twenty years ago when personal digital assistants (PDAs) were launched and became popular. A PDA is a handheld PC which is a pocket-sized mobile device with wireless connectivity, a web browser and touchscreen features. PDAs are regarded as the predecessors of smartphones (Viken, 2009; Smith & Wempen, 2011). In view of these special features, educators considered how to make good use of these mobile devices in education (Trifonova, 2003). In terms of the benefits of mobile learning, Naismith et al. (2004) were the first to summarize six broad theory-based categories for activity-centered mobile learning, i.e. (a) behaviorist, (b) constructivist, (c) situated, (d) collaborative, (e) informal and lifelong, and (f) learning & teaching support, which clearly provided guidance for

researchers and practitioners in research into and practice of mobile learning. Meanwhile, scholars put forward different definitions of mobile learning but most of them were criticized as being too primitive and techno-oriented (Crompton, 2013). Since then, Sharples, Taylor, and Vavoula (2007) formally defined mobile learning as “a contextual and informal learning which features the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies (Sharples, Taylor, and Vavoula, 2007: 225)”. Nevertheless, Mobile learning is still at an embryonic stage and keeps changing; scholars and practitioners continue to understand different areas of mobile learning (Goh, 2006).

For the past decade, many scholars and practitioners have been engaged in understanding the student benefits of mobile learning, including (1) value added, (2) instant access, (3) usefulness, (4) learning aid, (5) personalization, (6) efficiency, (7) convenience, (8) push & pull messages and (9) a supplementary tool (Motiwalla, 2007; Huang, Lin & Chuang, 2007). In Hong Kong, more colleges and universities have started to realize the importance of mobile learning. Some began to invest in mobile learning technology or subscribe to mobile learning services so as to incorporate mobile learning strategically (PolyU, 2017; Kahoot, 2017; CPCE, 2017). Alternatively, some institutions made use of social networking sites, for instance, Facebook, or Web 2.0 collaborative platforms, for instance, Google Drive, to facilitate mobile learning (SCOPE, 2017; Lam, 2015). As outcome-based education is required by the Hong Kong Education Bureau for higher education accreditation in Hong Kong, mobile learning has increasingly become one of the common blended teaching and learning approaches to promote collaboration, interaction, communication and motivation in the classroom and hence fulfill the activity requirements in outcome-based education (EDB, 2016; Lau & Lam, 2012; Lam, 2015).

2.2 Mobile learning

2.2.1 Definition of mobile learning

The concept of mobile learning appeared when practitioners and scholars started to consider the use of personal digital assistants (PDAs) as learning devices. Scholars like Soloway et al. (2001) defined mobile learning as using a PDA for learning purposes in the 2000s (Crompton, 2013). Other scholars started to define mobile learning. After rigorous discussions among scholars, Sharples, Taylor, and Vavoula

(2007) formally defined mobile learning as “a contextual and informal learning which features the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies (Sharples, Taylor, and Vavoula, 2007: 225)”. Some scholars, like Laurillard (2007) further pointed out that mobile learning should include learning activities that were productive, investigative, collaborative, communicative and adaptive which teachers could manage remotely. Besides, Cochrane (2010) defined mobile learning as “the use of wireless-enabled mobile digital devices (wireless mobile devices [WMDs]) within and between pedagogically designed learning environments or contexts. From an activity theory perspective, WMDs are the tools that mediate a wide range of learning activities and facilitate collaborative learning environments (Cochrane, 2010:3)”. Cochrane’s definition of mobile learning has echoed the arguments of Laurillard that (1) learning was not bounded by the classroom and (2) learning activities encouraged interaction, communication and collaboration. Recently, some scholars like Wang, Wu & Wang (2009), based on latest mobile technologies, defined mobile learning as “the delivery of learning to students anytime and anywhere through the use of wireless internet and mobile devices, including mobile phones, personal digital assistants (PDAs), smartphones and digital audio players. (Wang, Wu & Wang, 2009:93)”. Wang, Wu & Wang’s definition of mobile learning has highlighted an important idea, i.e. learning can occur anywhere, anytime.

Since the concept of mobile learning was introduced in the 2000s, practitioners and scholars have explored the approaches and benefits of mobile learning. Naismith et al. (2004) suggested six broad theory-based categories for activity-centered mobile learning, i.e. (1) behaviorist, (2) constructivist, (3) situated, (4) collaborative, (5) informal and lifelong, and (6) learning & teaching support, which clearly provided guidance for researchers and practitioners in the research into and practice of mobile learning. Firstly, the behaviorist category of mobile learning means using mobile technologies and devices for showing learning materials, receiving learners’ responses and providing feedback appropriately (Naismith et al., 2004:10). This approach is, it is suggested, based on the classical conditioning theory (Rescorla & Wagner, 1972), the operant conditioning and behaviorism (Skinner 2011) and the transmission model (Naismith et al., 2004:10). In other words, mobile technologies and devices are used to present a problem (stimulus) followed by the solution from the learner (response)

and then feedback is given by the system to provide reinforcement, i.e. learning can be accomplished by transmitting the information from the tutor (the system) to the learner. It has received support from literature because of the benefits perceived by the learners. Secondly, the constructivist category of mobile learning means learners should be encouraged to discover knowledge using mobile devices so that learners are transformed from passive information receivers to active knowledge constructors (Naismith et al., 2004:10). This kind of approach is, it is suggested, based on cognitive theories of learning by Bruner (1966) and the theory by Piaget on child development (Naismith et al., 2004). In terms of mobile learning, mobile technologies and devices allow learners to construct the knowledge and access to information simultaneously. Thirdly, the situated category of mobile learning refers to the use of mobile devices in social participation, which can facilitate learning (Naismith et al., 2004:13). It is originated from Situated Learning Theory as developed by Lave (1991). According to Situated Learning Theory, knowledge is delivered in the form of authentic contexts, i.e. the settings and applications involve that knowledge (Lave & Wenger, 1991). In other words, learning can be facilitated through various activities in communities which increase the participation of learners. Fourthly, the collaborative approach refers to the learning process which occurs in a virtual or physical social environment, for instance, community, team or group, where individuals interact, communicate and collaborate with others (Strijbos, 2106). The concept of collaborative learning originates from the Vygotsky's socio-cultural psychology (Vygotsky, 1978), activity theory (Engeström, 1987), and conversation theory (Park, 1976). Collaborative learning evolves with wireless technology (Colella, 2000; Soloway et al., 2001). Fifthly, the informal and lifelong approach means "learning happens all the time and is influenced both by our environment and the particular situations we are faced with" (Naismith et al., 2004:17). Informal learning is about individuals obtaining information by conversations, television, newspapers, observation and experiences (Tough, 1971). In addition to using smartphones for in-class activities, informal learning occurs when the smartphone is used out of the classroom. Lastly, mobile technologies and devices can provide learning and teaching support to learners without being employed as part of the learning activities (Naismith et al., 2004:18). The mobility features of smartphones provide learners with the opportunities to learn anywhere, anytime (Wang, Wu & Wang, 2009). It is because a smartphone is an internet-based mobile device that learners can simply search for

information from the internet when facing any real-world problems (Wang, Lee & Yang, 2004). Therefore, the functions and features provided by smartphones create learner-centric design for learners.

Mobile learning can be implemented flexibly with different combinations of settings in the learning environment, the learning activities and the mobile devices. Motiwalla (2007) carried out mobile learning research about students using wireless devices for learning within a campus where there were two phases of student survey, i.e. (1) feedback on mobile learning and (2) perception of the role of mobile learning. The results showed that students experienced the benefits of mobile learning including (1) value added, (2) instant access, (3) usefulness, (4) learning aid, (5) personalization, (6) efficiency, (7) convenience, (8) push & pull messages and (9) as a supplementary tool. Scholars Chen, Kao & Sheu (2003) carried out an outdoor mobile learning research to develop a mobile learning system for scaffolding bird-watching learning. Their findings revealed that mobile technologies were suitable for the multi-instructional techniques, i.e. scaffolding, because the mobile devices created an interactive, supportive, and individualized learning outdoor environment to cultivate learners to be more independent and self-directed in learning and to support their knowledge construction in an authentic learning activity.

Further, some scholars began to explore the factors influencing the successful implementation of mobile learning. Zurita & Nussbaum (2004) argued that one of the benefits from mobile learning was the facilitation of student collaboration. To this end, there were eight issues to be addressed, namely, (1) the nature of the learning tasks; (2) member roles; (3) task materials that enable execution of the task; (4) appropriate teacher behavior; (5) collaborative learning goals; (6) formative evaluation with feedback from peers or from educators; (7) appropriate member behavior and (8) additive evaluation and reward structure (Zurita & Nussbaum, 2004). In other words, successful mobile learning is not simply the use of a smartphone in learning, but requires proper understanding of the learning context and appropriate integration of mobile technologies. Scholars Waycott & Kennedy (2009) pointed out that Web 2.0 and mobile technologies had become part of students' everyday lives. The successful implementation of mobile learning in education required careful consideration of six areas, including, (1) the pedagogical integration of the technology into the course and

assessment; (2) lecturer modeling of the pedagogical use of the tools; (3) creating a supportive learning community; (4) appropriate choice of mobile devices and Web 2.0 social software; (5) technological and pedagogical support; and (6) creating sustained interaction that facilitates the development of ontological shifts, both for the lecturers and the students (Waycott & Kennedy, 2009). However, some scholars believed that mobile learning success could be investigated from the technology acceptance perspective. Wang, Wu & Wang (2009) made use of the Unified Theory of Acceptance and Use of Technology to investigate the factors affecting student acceptance of mobile learning. Their research results indicated that perceived playfulness, effort expectancy, performance expectancy, self-management of learning and social influences were the determinants affecting students' acceptance of mobile learning. Similarly, Scholars Park, Nam & Cha (2012) conducted an empirical study of mobile learning using the Technology Acceptance Model. Their findings evidenced that mobile learning acceptance was influenced by perceived usefulness, perceived ease of use, self-efficacy of mobile learning as well as the attitudes of students, the relevance to their major, system accessibility and subjective norm (Park, Nam & Cha, 2012). Thus, mobile learning success depends on the proper combination of the mobile technologies, educational settings and the student's intention to use.

2.2.2 Benefits of mobile learning

Crompton (2013) explained mobile learning was a kind of e-learning using mobile devices as the media. Since the emergence of mobile learning in the 2000s, scholars and practitioners have been interested in exploring the benefits of mobile learning. The direct benefits of mobile learning are always related to the usability of the mobile devices. Bruns (2005a; 2005b) argued that mobile learning provided learning flexibility due to the mobility of the wireless device or smartphone. Maudsley & Strivens (2000) argued that mobile learning could improve critical thinking because the mobile device allowed learners to search for useful information from the internet. Some scholars, Chen, Kao & Sheu (2003), Peng et al. (2009) and Ebner & Schiefner (2008, January) agreed with Maudsley & Strivens's arguments because learners could be more active and flexible in finding information necessary to support their learning. The mobility benefit of mobile learning allows learners to learn anywhere, anytime,

which, in turn, facilitates informal learning (Scanlon, Jones & Waycott, 2005; Clough et al., 2009; Kumar et al., 2010).

Other scholars believed communication was one of the strengths in mobile learning. It is because mobile devices, like smartphones, support WIFI and internet access. Mobile learning can facilitate communication and interaction (Herrington & Herrington, 2007). Some institutions in Hong Kong, like Hong Kong Polytechnic University (PolyU) and The College of Professional and Continuing Education (CPCE) have subscribed to mobile learning services to facilitate communication and interaction (CPCE, 2017; PolyU, 2017). Depending on the platforms or application used, the benefits of mobile learning would be different. For instance, some scholars made use of Google docs (Roschelle & Pea, 2002; Cruz-Flores & López-Morteo, 2008; Cheung & Vogel, 2013) and Facebook (Lam, 2012, 2015) for mobile learning in order to improve student collaboration, peer-to-peer learning and learning flexibility (Yao, 2010, August).

However, Olivier (2011) pointed out that mobile learning was likely to be successful if mobile technologies were properly chosen and deployed in teaching and learning. Olivier's arguments are supported by the research findings from Waycott & Kennedy (2009) that there are critical success factors contributing to mobile learning.

2.2.3 Concerns about mobile learning

Despite the benefits of mobile learning, some researchers have raised concerns about mobile learning. In the study of mobile learning in vocabulary, Stockwell (2007) found that students were not eager to use mobile devices because of their physical limitations, i.e. small screens, and affordability, i.e. cost. This is supported by the arguments of Goth, Frohberg & Schwabe (2006, November) that the learning process is hindered by the mobile technology itself, including (1) students are distracted by their smartphone, for instance, they use other apps or play games during learning, (2) student learning is hindered by learning additional technologies, for instance, using Facebook, Skype, Google drive. Other problems include wireless connectivity and stability, which may inhibit student learning and their learning motivation (Shudong & Higgins, 2005, November).

2.3 Social media

2.3.1 Definition of social media

According to Obar & Wildman (2015), social media are certain computer-mediated technologies existed in form of a platform allowing users to communicate, contribute, collaborate and create online. There were four different types of social media platforms, namely, social networking, microblogging, photo sharing and video sharing. Examples of social networking include Facebook, LinkedIn and Google+. Microblogging has examples of Twitter and Tumblr. Instagram, Snapchat and Pinterest are examples of photo sharing. Video sharing examples are YouTube, Facebook Live, Periscope and Vimeo (Warren, 2018). The history of social media could be originated from the ARPANET in 1970 (Monica, 2016). In 1979, the Usenet was created allowing users to post messages via Internet. In 1990, a social networking site called 'Open Diary' was created which symbolized the paradigm of social media (Kaplan & Haenlein, 2010). Some scholars, like Moorhead et al. (2013), believed that the growing popularity of social media was due to (1) the interaction, communication, collaboration due to Web 2.0 technologies, (2) the powerful dissemination of information, (3) the ease of information access, and (4) the emotional and social support by peer. Their arguments are echoed by other scholars, like Ray & Saeed (2015) that the advancement in information and communication technology (ICT) had catalyzed the development of social media, which become part of daily life and people rely on social media platforms to share information and get connected. For the past decades, billions of people had joined in different social media platforms generating massive amount of online information. Scholars, Kaplan & Haenlein (2010), believed that large amount of social media users and huge amount of information could create enormous opportunities for companies. Their arguments are supported by scholars, Noone, McGuire & Rohlf's (2011) that social media could improve the revenue in hotel business. Other scholars, like Weaver, Lindsay & Gitelman (2012), also echoed the arguments of Kaplan & Haenlein (2010) that social media was an excellent platform for building health care communities and widening the access to health care information. Similarly, student engagement was improved using social media in education as reported by scholars Gikas & Grant (2013).

Therefore, some scholars, Ray & Saeed (2015), argued that the social media activities of Internet users and huge amount of data could be useful for researchers to develop behavioral model in order to understand their attitudes and predict their future behavior which would constitute to the business success and application development.

2.3.2 Social media and mobile learning

Many scholars believe in the potential of social media in education and include social media in teaching and learning (Moran, Seaman & Tinti-Kane, 2011; Dabbagh & Kitsantas, 2012; Gikas & Grant, 2013; Cheston, Flickinger & Chisolm, 2013). Moran, Seaman & Tinti-Kane (2011) had evidenced that over 90% of higher education faculty members were aware of social media where over 40% of faculty had instructed students to use social media for learning activities like (1) post content for class, (2) use in class, (3) assign students to read/view, and (4) assign students to post. Other scholars, Dabbagh & Kitsantas (2012), echoed the findings of Seaman & Tinti-Kane (2011) that statistics from the 2010 ECAR (EDUCAUSE Center for Applied Research) showed the use of social media by undergraduate student in learning had grown continuously from 2007 to 2010. Among the undergraduate students, one third of them had used social media for collaboration in doing coursework. Social media was facilitating student learning formally and informally. Besides, faculty was increasingly integrating social media to assist teaching and learning activities. Meanwhile, scholars, Gikas & Grant (2013), pointed out that there was a trend students' use of social media had shifted to smartphone due to the advancement in mobile technologies which implied social media were empowered with mobility. Gikas & Grant (2013) believed that it was necessary to understand student attitude towards social media with smartphone. Their findings revealed that students preferred using social media with smartphone in learning because (1) quick access to course materials anywhere anytime, (2) instant communication with peers, (3) interaction and collaboration, and (4) sharing information. Some scholars, Ray & Saeed (2015), agreed with mobile learning using social media because of the continuous growth in the popularity of using social media with smartphone. Most importantly, students and faculty were increasingly adopting and integrating social media to support teaching and learning.

In recent years, there were scholars investigate the use of social media in mobile learning. Dron & Anderson (2014) argued that with mobile learning using social media, students were allowed to discuss with one or more classmates where their opinions or idea would be kept on the wall of the social media. The wall was usually arranged in timeline format where students could revisit all the messages posted by teachers and students. To demonstrate the benefits of social media for mobile learning, Drigas et al., (2014) conducted a research studying if students could pay more attention to the challenges in learning. Their findings showed that students were willing to find the solutions to learning challenge with the help of social media via their smartphones. The arguments of Dron & Anderson (2014) and findings of Drigas et al., (2014) could be explained by Shen et al. (2017) that smartphone and social media could make students more engaged to learn and discuss with classmates. It was because they were always notified by social media via their smartphones whenever there were learning updates over the social media. Despite the benefits of using social media for mobile learning, some scholars, like Sobaih et al. (2016), believed that the success of mobile learning depends on the willingness of faculty. Sobaih et al. (2016) further posited that mobile learning using social media were of great academic value to teaching and learning as well as help bridging the institutions and students given the barrier is overcome.

2.4 Social networking sites

A social networking site (SNS) is an internet community with a membership scheme. This internet community allows users to communicate, interact and share information. Popular social networking sites include Facebook, MySpace, LiveJournal and Friendster. A social networking site is a kind of social media platform.

2.4.1 Facebook

Among those popular social networking sites, Facebook is the most popular social media platform worldwide (Pempek, Yermolayeva & Calvert, 2009). Resnick (2002) explained that the social interaction from using Facebook was a kind of conscious investment that increased the social capital of an individual where social capital is people's available resources via their social interactions (Lin, 2001). When using

Facebook, people can search for old or new friends, accumulate friends, post comments, respond using facial icons, and join virtual groups based on interests and hobbies. This can benefit users who have low self-esteem and low satisfaction with life (Ellison, Steinfield & Lampe, 2007). People are increasingly spending time and interacting on social network sites, for example, Facebook, because of the texts, photos and videos shared by friends, and games available over Facebook (Cheung, Chiu Lee, 2011; Kaplan & Haenlein, 2010).

2.4.2 Benefits of mobile learning using Facebook

Though Facebook is a social network site primarily used as a social platform for interaction and communication, researchers have begun to investigate the educational potential of Facebook. Some scholars have investigated the relationship between Facebook private study groups and student learning engagement (Lam, 2012; Lau & Lam, 2012). Other scholars, like Ross et al. (2009), have examined the benefits of using Facebook to improve students' personality and motivation. Besides, Huang, Lin & Chuang (2007) believed that mobile learning would provide an optional channel of learning. Motiwalla (2007) echoed the findings of Ross et al. (2009) that mobile learning using Facebook could improve learning convenience and flexibility. Scholars, like Wankel & Blessinger (2013) and Kabilan, Ahmad & Abidin (2010) argued that mobile learning using Facebook could improve learning engagement because mobile technologies could facilitate student learning. Some scholars further evidenced the benefits of mobile learning, including improved learning effectiveness and outcomes (Wang, Wu & Wang, 2009; Valk, Rashid & Elder, 2010), improved learning plan and path (Corlett et al., 2005), personalized learning and usage patterns (Stockwell, 2008), encouraging communication and collaboration (Kukulska-Hulme & Shield, 2008; Suwannatthachote & Tantrarungroj, 2013), improved learning engagement (Lam, 2012; Lau & Lam, 2012 Aug; Lam, 2012 June), improved collaboration (Lam & Cheung, 2013), improved learning motivation (Lam, Lau & Ngan, 2013; Ciampa, 2014) and improved student identity and teacher/student relationships (Lam & Ng, 2015). Mazer, Murphy & Simonds (2007) explained that the new generation of students was aware of their social capital and social presence on Facebook. Therefore, given the class activities over Facebook, students could likely be motivated to learn

due to effective learning and hence, the overall climate of the classroom would be improved (Cheung, Chiu, Lee, 2011; Madge et al., 2009; Roblyer et al., 2010).

2.4.3 Concerns about using Facebook in learning

By contrast, some scholars disagreed with the use of Facebook in learning because of the privacy issue of using a social network site for learning (Acquisti & Gross, 2006). Other scholars also expressed concerns about the issue of distraction in-class while using Facebook, for instance, (1) notifications from Facebook, (2) messages from Facebook friends, (3) Facebook games (Debatin et al., 2009).

Despite those concerns, Lam (2010) and Lam & Ng (2015) explained the privacy issue in Facebook could be resolved by proper Facebook privacy settings. As for distraction, Fewkes & McCabe (2012) explained it could be improved by proper instructions in-class, for instance, students are not allowed to use smartphones during lectures, except to participate in Facebook in-class learning activities.

2.5 Students' adoption of Facebook for mobile learning

2.5.1 Reasons for understanding students' adoption of mobile learning

Many scholars have investigated using either Facebook or smartphones in learning for the past decade (Bruns, 2005a; 2005b; Maudsley & Strivens, 2000; Chen, Kao & Sheu, 2003; Peng et al., 2009; Ebner & Schiefner, 2008, January; Scanlon, Jones & Waycott, 2005; Clough et al., 2009; Kumar et al., 2010; Lam, 2010). Recently, some scholars have started to explore using Facebook for mobile learning (El-Hussein, M & Cronje, 2010; Park, 2011; Pimmer, Linxen & Gröhbiel, 2012; Lam & Ng, 2015). Despite the benefits of using Facebook for mobile learning, it is necessary to understand what drives the students' adoption of Facebook for mobile learning (Huang, Lin & Chuang, 2007; Wang, Wu & Wang, 2009). This is important because it explains the factors which affect the students' acceptance of using mobile learning and hence their learning engagement and satisfaction (Lam, 2010; Lau & Lam, 2012; Lam & Ng, 2015; Heflin, Shewmaker & Nguyen, 2017). From the institutional perspective, student retention depends heavily on student learning success in terms of

the completion of their studies. Therefore, an appropriate blended pedagogical strategy could ultimately improve student engagement and retention and secure the tuition revenue of the institution (Wankel, & Blessinger, 2013; Yorke & Longden, 2004; Hrabowski & Suess, 2010; Olivier, 2011).

2.5.2 Factors influencing students' adoption of mobile learning

Many scholars have investigated different factors affecting the adoption of mobile learning. Liu, Han, & Li (2010) argued that mobile learning adoption was contributed to by three areas, i.e. (1) technology user: perceived mobility, perceived ease of use and perceived usefulness; (2) consumers: perceived quality; and (3) subjective task value and readiness for mobile learning. Similarly, Cheon et al., (2012) applied the Theory of Planned Behavior (TPB) to investigate mobile learning readiness. They proposed that behavioral intention for mobile learning was predicted by three attitudinal constructs, namely, (1) attitude, (2) subjective norm, and (3) perceived behavioral control. Their research findings showed that perceived behavioral control had the strongest influence on behavioral intention for mobile learning, followed by attitude and subjective norm. Perceived self-efficacy and learning autonomy would affect students' willingness to adopt mobile learning (Cheon et al., 2012).

Huang, Lin & Chuang (2007) applied the Technology Acceptance Model (TAM) (Davis et al., 1989) in the context of mobile learning. Although the TAM is extensively used by scholars and practitioners to understand technology adoption in different contexts, it is criticized for the limited explanatory ability due to its assumption that an individual's intention to use certain systems or technology is predicted by two determinants (Taylor and Todd, 1995). Some scholars, Wang, Wu & Wang (2009), used the Unified Theory of Acceptance and Use of Technology (UTAUT) to examine the factors influencing user behavior in mobile learning. The research findings of Wang, Wu & Wang (2009) showed that effort expectancy, performance expectancy, perceived playfulness, self-management of learning and social influence were significant factors influencing behavioral intention to use mobile learning where (1) age differences have a moderating effect on effort

expectancy and social influence, and (2) gender differences have a moderating effect on social influence and self-management of learning.

Although UTAUT is widely employed to understand different kinds of technology adoption, it was primarily developed to understand the technology acceptance and use behavior of employees. UTAUT is unable to explain directly the context of consumer technologies (Venkatesh et al., 2012). Consumer technology is increasingly important because it is a billion-dollar industry (Stofega and Llamas, 2009) and technology plays an important role in human daily life (Meuter et al., 2013; Gilly & Zeithaml, 1985). To this end, additional constructs must be employed to explain consumer adoption. Therefore, The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) was developed based on UTAUT, to explain the adoption of consumer technologies (Venkatesh et al., 2012). Three additional constructs were added to UTAUT2, i.e. (1) hedonic motivation, (2) cost, and (3) habit. Hedonic motivation is included in UTAUT2 because it is a kind of enjoyment encouraging the user's acceptance of technology (Mun & Hwang, 2003; Venkatesh, 2000; Ha & Stoel, 2009). The integration of hedonic motivation can improve the predicting ability of other major constructs in consumer technologies adoption. The second new construct, cost, it is required in consumer technology, but traditional UTAUT targets office users and does not have a cost construct. The cost construct can compensate for the shortcomings of UTAUT which considers effort and time. The third construct is called habit which can reflect whether the consumer uses the technology intentionally (Venkatesh et al., 2012). Some scholars, like Yang (2013), examined undergraduate students' adoption of mobile learning in China using UTAUT2. The research findings of Yang (2013) showed that hedonic motivation had the strongest influence on students' intentions to use mobile learning, followed by social influence, price/value, and performance expectancy. The results also showed that effort expectancy and habit did not have a significant influence on the intention to use mobile learning. Besides, the factor 'self-management of learning' was found to have a negative effect on students' adoption of mobile learning. Yang (2013) explained the inconsistencies with UTAUT2 were due to (1) mobile device features, for instance, small screens and virtual keyboards, and (2) the culture of undergraduate students who preferred formal education channels. Among the four major predictors in UTAUT and UTAUT2, prior literature has evidenced that two of the predictors do not always have a significant

influence on behavioral intention to use technology. These include facilitating conditions (Wong, Teo & Russo, 2013; Lin & Anol, 2008) and social influence (Park, Yang & Lehto, 2007; Schaper & Pervan, 2007). Venkatesh (2000) explained that these insignificant relationships were due to the mediating effect of effort expectancy.

The technology acceptance models are extensively used in literature to test and validate empirically mobile learning adoption in different contexts, nevertheless some scholars believe there are other factors influencing technology adoption. One school of thought suggests that mobile learning behavioral intention is affected by the technology itself (Kukulska-Hulme & Traxler, 2005; Traxler, 2005; Corlett, Sharples, Bull & Chan, 2005; Koole, 2009; Park, 2011; Cheung, 2013). Kukulska-Hulme & Traxler, 2005 argued that usability was an important element in mobile technology. Device usability is a collective concept of effectiveness, efficiency, satisfaction, security and ease of learning (Abran et al., 2003). A mobile device is said to have good usability if it can facilitate learning by providing useful functions and enhancing learning efficiency (Kukulska-Hulme & Traxler, 2005). Traxler (2005) pointed out mobile learning was characterized in terms of being spontaneous, portal, situated, context aware, because of the high usability of mobile devices including (1) connected, (2) personalized and (3) interactive functions. Their arguments are supported by the research findings of Corlett et al., (2005) that mobile device usability could engage student to learn due to its portable features, learning support and timely information. The concept of usability in mobile learning is further consolidated in The Framework for the Rational Analysis of Mobile Education (FRAME) model developed by Koole (2009). The FRAME model is presented in form of a Venn diagram used to describe mobile learning. The model states that mobile learning is affected by three major factors, namely, device, learning and social, where there are three overlapping areas, including, (1) device usability being device and learner; (2) social technology being device and social; and (3) interaction learning being learning and social. Among the three major areas, Koole (2009) believed that device factor was as important as learner and social factors in mobile learning. The learner factor is about the learner's ability and attitude to learning, whereas the social factor is about interaction, communication and collaboration. The device factor is about mobile device hardware characteristics, their usability and affordability (Koole, 2009). The FRAME model was tested empirically by Cheung (2013) in the context of Hong Kong Polytechnic

University. The research findings showed that there were 4 factors having significant influence on students' mobile learning intention, including, (1) learner, (2) online interactions, (3) device features, and (4) dependence & sharing. However, (1) reference groups and (2) storage and weight were insignificant. The factor 'Learner' is related to the learner's willingness for, attitude to and ability in mobile learning. Online interactions are about online peer discussions on the group project. Device features include the physical characteristics of the smartphone, for instance, screen size, battery power, input methods, computation power, mobile applications and internet connectivity. Dependence and sharing consists of learning mobility, teacher support, and students' attitude to content sharing using a mobile device. Cheung (2013) concluded that students' adoption of mobile learning was affected by these four determinants and a university should promote mobile learning in order to complement the formal learning environment.

2.5.3 Factors influencing students' adoption of Facebook

During the past few decades, empirical studies were conducted by many scholars in order to identify the factors influencing adoption of Facebook. Cheung, Chiu & Lee (2011) proposed a research model to explain the adoption of Facebook. The research model contained nine factors, namely: subjective norm, group norms, social identity, purposive value, self-discovery, maintaining interpersonal interconnectivity, social enhancement, entertainment value and social presence. The research findings showed that social presence had the strongest influence on Facebook use intention followed by entertainment value, group norms, and social enhancement. Cheung, Chiu & Lee (2011) explained Facebook was a kind of Web 2.0 platform which supported collaborative learning, and Facebook could be used for group learning activities. Scholars, Suki, Ramayah & Ly (2012) tested the Facebook use intention using the Technology Acceptance Model. The research findings showed that perceived usefulness, perceived ease of use, perceived enjoyment and attitude had significant influences on the intention to use Facebook. It should be noted that Cheung, Chiu & Lee (2011) and Suki, Ramayah & Ly (2012) share common arguments that relate to entertainment. This implies that the entertainment or joy from Facebook plays an important role in student' use intention. Scholars Yang & Lin (2011) extended the

Technology Acceptance Model by adding three constructs, namely: social influence, concentration, and computer self-efficacy. The research findings showed that social influence and computer self-efficacy had significant effects on perceived usefulness and perceived ease of use respectively, whereas concentration had a significant influence on Facebook use intention. Some scholars examined Facebook adoption using the UTAUT and UTAUT2. Salim (2012) examined the adoption of Facebook for learning in the context of Egypt. The results were consistent with UTAUT except (1) gender did not have any correlations; (2) age had a correlation only with social influence and facilitating condition; and (3) voluntariness of use did not have any relationship with social influence. Salim (2012) explained the inconsistencies were due to cultural and political factors in Egypt. Further, Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano (2014) conducted an empirical study by extending UTAUT2 with two additional constructs called perceived advantage and perceived relevance. Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano explained that perceived advantage was the advantage perceived by the student in using Facebook for learning, whereas perceived relevance meant the student's positive attitude towards using Facebook for learning. The research findings showed that perceived advantage was significantly affected by performance expectancy, effort expectancy and hedonic motivation, whereas perceived relevance was significantly affected by social influence, facilitating conditions and habit. Besides, perceived advantage and perceived relevance influence significantly the behavioral intention to use Facebook for mobile learning.

2.5.4 Factors influencing students' adoption of Facebook for mobile learning

For the past few decades, scholars have been exploring many factors affecting students' adoption of mobile learning (Huang, Lin & Chuang, 2007; Wang, Wu & Wang, 2009; Liu, Han, & Li, 2010; Cheon et al., 2012; Yang, 2013; Cheung, 2013; Hao, Dennen & Mei, 2017) or Facebook (Chiu & Lee, 2011; Suki, Ramayah & Ly, 2012; Yang & Lin, 2011; Salim, 2012; Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014). Many scholars conducted empirical studies using the Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), UTAUT and

UTAUT2. Most of them have consistent results among the major determinants of behavioral intention. However, some of the predictors, like social influence, (Park, Yang & Lehto, 2007) and facilitating condition (Wong, Teo & Russo, 2013; Schaper & Pervan, 2007), do not always show a significant influence on behavioral intention. Therefore, the researcher attempted to conduct an empirical study by proposing a theoretical research model containing the determinants identified by scholars in the past.

2.5.4.1 *Performance expectancy*

The concept of “performance expectancy” was introduced in the UTAUT. Venkatesh et al. (2012) defined performance expectancy as "The degree to which using a technology will provide benefits to consumers in performing certain activities (Venkatesh, Thong & Xu, 2012:159)". Performance expectancy is developed based on five important components, namely: outcome expectation, extrinsic motivation, relative advantage, usefulness perceptions, and job-fit (Compeau & Higgins, 1995). The consumer's belief in the performance of technology can be explained by the Self-Standards Model of Cognitive Dissonance, which states that “the basis of dissonance motivation and the role played by cognitions about the self depend on the type of self-standards made accessible in the context of discrepant behavior (Stone and Cooper, 2001:1)”. Notwithstanding that people's behavior varies, people tend to use self-attributes to evaluate and justify their behavior, which is affected by the degree of dissonance arousal. For instance, a player in a competition has certain expectations, like winning the game, which is a normative standard causing the dissonance, resulting in negative expectancy and increasing the chance of poor performance (Stone and Cooper, 2001). This can further be explained by a psychological adaptation in self-affirmation theory that people facing threats (dissonance) would try to restore their integrity of self and result in behavioral adaption (Sherman & Cohen, 2006). According to Shin (2009), there are three factors influencing performance expectancy, i.e. job fit, perceived usefulness and extrinsic motivation. Empirical studies have confirmed performance expectancy is a significant predictor to behavioral intention to use different technologies, for instance, web-based learning (Chiu & Wang, 2008), an e-learning system (Lee et al., 2011), an educational portal

(Paola et al., 2011), a student portal (Bakar et al., 2013), e-learning websites (Tan, 2013); Web 2.0 collaborative technologies (Cheung & Vogel, 2013); learning management software (Raman & Don, 2013), mobile payment (Morosan, 2016), internet banking (Arenas-Gaitán et al., 2015) and social recommender systems (Oechslein, Fleischmann & Hess, 2014). Some scholars, like Carlsson et al. (2006) and Park, Yang & Lehto (2007), have evidenced the relationship of performance expectancy to behavioral intention in the context of mobile technologies. Wang, Wu & Wang (2009) have echoed the findings of Carlsson et al. (2006) and Park, Yang & Lehto (2007) in the context of mobile learning. Many scholars have also evidenced the influence of performance expectancy on the adoption of mobile learning (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014; Diep et al., 2016; Hamzat & Mabawonku, 2018).

2.5.4.2 *Effort expectancy*

Effort expectancy is defined as "The degree of ease associated with consumers' use of the system (Venkatesh, Thong & Xu, 2012:159)". Unlike performance expectancy, effort expectancy has contrasting perceptions before and after using the technology because users have hands-on experience after use and their perceptions toward effort expectancy become well-formed (Venkatesh & Davis, 1996). This is because before using certain technology, the perceptions of users come from their general beliefs about the computer or technology, but after using the technology, users have hands-on experience which helps them to perceive the ease of use of that technology (Venkatesh, 2000). The influence of effort expectancy on intention to use is supported by the Expectation-Confirmation Model (ECM) on IS continuance intention, that disconfirmation of effort expectancy results in satisfaction, and subsequent perceived ease of use towards the system which, in turn, affects IS continuance intention to use. In other words, the technology usage process helps students disconfirm or confirm their expectations, so it would help them realize the expected benefits of system usage so that their perceptions become more realistic (Bhattacharjee, 2001). Furthermore, prior acceptance studies of technology have validated the theory that effort

expectancy has significant predicting power on behavioral intention, for instance, e-government (Van Dijk, Peters & Ebbers, 2008), online question/answer service (Deng, Liu & Qi, 2011), mobile payment (Morosan, 2016), internet banking (Arenas-Gaitán et al., 2015), educational portals (Paola et al., 2011), student portals (Bakar et al., 2013), e-learning websites (Tan, 2013); Web 2.0 collaborative technologies (Cheung & Vogel, 2013); learning management software (Raman & Don, 2013), and social recommender systems (Oechslein, Fleischmann & Hess, 2014). The relationship between effort expectancy and behavioral intention is further supported by the empirical studies of mobile e-books (Gao and Deng, 2012 June) and mobile searches (Samudra & Phadtare, 2012). Many scholars have reported the influence of effort expectancy on the adoption of mobile learning (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014; Razak, Bakar & Abdullah, 2017; Nikou & Economides, 2017).

2.5.4.3 Hedonic motivation

From the technology acceptance perspective, hedonic motivation refers to "the fun or pleasure derived from using a technology" (Venkatesh, Thong & Xu, 2012:161). From the motivation perspective, hedonic motivation is about the influence of people's pleasure and pain and the subsequent desire to achieve a goal or move away from risk (Ahtola, 1985; Higgins, 2006). In the study of hedonic motivation, Khan, Dhar & Wertenbroch (2004) argue that not all consumer purchases are hedonic, for instance, consumers feel pleasure when they buy their luxury/desired items but they do not feel joy or fun when buying necessities or daily items. Furthermore, hedonic motivation may be related to someone's willingness to do something, for instance, chewing gum, but this behavior may be inhibited by a government regulation that chewing gum is subject to a fine or imprisonment. Therefore, hedonic motivation is affected by external intervention. This is supported by the argument of (1) Schacter, Gilbert & Wegner (2011) that pleasure-seeking is one of the fundamental element of all motives which happen in both animals and humans; and (2) Waterman et al., (2008) that intrinsic motivation is a function of hedonic enjoyment and personal

expressiveness. Thus, hedonic motivation plays an important role in attitude and intention to use. Prior empirical studies evidenced the positive significant relationship between hedonic motivation and behavioral intention in different contexts, for instance, learning management software (Raman & Don, 2013), online purchasing of tickets for low cost carriers (Escobar-Rodríguez, Carvajal-Trujillo, 2014), Facebook (Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014), decision support systems (Kim, Kim & Wachter, 2013), information systems (Wang & Scheepers, 2012), healthcare web (Slade, Williams & Dwivedi, 2013, March), online hotel reservations (Mäntymäki & Salo, 2013), e-learning based on cloud computing (Nguyen, Nguyen & Cao, 2014, April), mobile shopping (Yang & Forney, 2013), online shopping (Childers et al., 2002; To, Liao & Lin, 2007; Ha & Stoel, 2009), hedonic information systems (Van der Heijden, 2004), computers (Fagan et al., 2008) and mobile services (Nvsveen et al., 2005). Liu, Li & Carlsson (2010) and Kang et al. (2015) have evidenced the relationship between hedonic motivation and behavioral intention in the context of mobile technology. In addition, the influence of hedonic motivation on the adoption of mobile learning has been supported by extensive literature (Yang, 2013; Huang, Lin & Chuang, 2007; Cheon et al., 2012; Bere, 2014 April; Lowry et al., 2012; Tarhini, Mohammed & Maqableh, 2016, El-Masri & Tarhini, 2017; Sharif & Raza, 2017).

2.5.4.4 *Habit*

The Pew Research Centre (2015a) US survey on Teens, Social Media & Technology Overview reports that due to the popularity of smartphones, about 75% of teens (age 13 to 17), who would be higher education students, have had access to a smartphone at least once, and 30% have basic phones, whereas 12% have no cell phones. In terms of usage, 92% of teens go online daily of which 24% report going almost constantly, 56% report going several times daily, 12% report going once a day and 6% report going weekly (Pew Research Center, 2015a-e). Furthermore, the Pew Research Center (2015a) US survey on social media usage reports that 90% of young adults use social media heavily, where 82% of them use Facebook. The use of Facebook and smartphones has become habitual actions in students' daily lives (Giannakos et al., 2013; Perlow, 2012). Habit refers to "the extent to which people tend to perform

behaviors automatically because of learning” (Venkatesh, Thong & Xu, 2012:161). Habit is very important because it explains subconscious or automatic behavior, in contrast to intention which belongs to conscious behavior (Limayem & Hirt, 2003). For instance, according to Triandis (1980), habits and intentions exhibit opposing influences on actual behavior as a function of time, i.e. the influence of intentions decreases over time, whereas the effect of habits increases correspondingly. The changing influence over time is due to the increase in an individual's experience. This is supported by the research findings of Limayem & Hirt (2003) about students' adoption of the Web Board in the university education context in Hong Kong, that habit and intention have significant effects on actual usage. Given students are instructed to use certain technologies to assist learning; they would use technologies automatically over time because they realize that the technologies can facilitate their learning (Limayem & Hirt, 2003). Prior studies have evidenced the significant relationship between habit and the actual usage behavior in areas including Facebook (Giannakos et al., 2013) and smartphones (Perlow, 2012), taobao.com (Pahnila et al., 2011), ebay.com (Pahnila, Siponen & Zheng, 2011); sporadic-use IT (Wilson et al., 2010), mobile payments (Dahlberg & Öörni, 2007), airline e-commerce (Rodríguez & Trujill, 2013), CASE tools (Marcinkowski, & Wrycza, 2015), online purchasing tickets for low cost carriers (Escobar-Rodríguez, Carvajal-Trujillo, 2014), social media (Suryana, 2014), mobile devices (Van Winkle et al.) and learning management software (Raman & Don, 2013; Lam, 2015). In terms of mobile learning, many scholars have reported the relationship between habit and behavioral intention (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014; Yahia, Al-Neama, & Kerbach, 2018).

2.5.4.5 Device usability

Usability is defined as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (ISO 9241:1992). According to Nayebi, Desharnais & Abran (2012, April), a device is said to have usability if (1) it can be used efficiently, (2) it can be

learned easily and (3) it can satisfy user requirements and meet their expectations. From the human-computer interaction (HCI) perspective, a usable device or system has features which are efficient and effective to use, easy to learn and enjoyable (Kukulska-Hulme, 2005). In recent years, the smartphone has been widely adopted in learning. The smartphone is “a combination cellphone and handheld computer that created the greatest tech revolution since the internet” (Magazine, 2011). A smartphone is a mini-computer because it can perform all the functions that a computer can perform, and it is more than a computer because it is portable. The first smartphone was called a personal communicator which was produced by IBM and BellSouth in 1994. Then, many different smartphones were made by manufacturers including Palm, PDA, BlackBerry, whose these smartphones have their own operating systems, for instance, WindowsCE, PalmOS, Symbian and BlackBerry. In 2007, there was an evolutionary change in the smartphone market because the iPhone was launched, then the Android Phone (Magazine, 2011). The dominance of iPhones and Android Phones is attributed to their user friendliness and usability which can reduce the psychological and physiological stress, improve learning curve, and improve the user’s ability to operate the device (Duh et al., 2006). Apart from the basic functions provided by smartphones including wireless connectivity, calendar, calculator, camera, video and audio recorder, the degree of power is based on the number of mobile applications installed in the smartphone. In other words, the more the mobile applications installed, the more powerful the smartphone (Allen, Graupera & Lundrigan, 2010). In view of the high degree of usability of smartphones, there are many research studies investigating the benefits of usability. This includes (1) improving the learning effectiveness because of the mobility (Bruns, 2005a; 2005b) which encourages active learning (Ebner & Schiefner, 2008, January) and critical thinking (Maudsley & Strivens, 2000); (2) improved communication, interaction and entertainment (Herrington & Herrington, 2007) and collaboration over Web 2.0 platform (Roschelle & Pea, 2002; Cruz-Flores & López-Morteo, 2008; Cheung & Vogel, 2013); (3) improved informal learning (Scanlon, Jones & Waycott, 2005; Clough et al., 2009; Kumar et al., 2010); (4) improved peer-to-peer learning and knowledge construction (Yao, 2010, August). By contrast, some researchers argue the limitations of smartphones, including (a) small screen size (Kim & Sundar, 2014), (b) inconvenient touch screen keyboard for typing (Page, 2013), (c) unstable internet connection (Pendell & Bowman, 2012), (d) learning platforms are not well-designed

for smartphones (Gregory & Catlin, 2013). Prior studies have evidenced the significant relationship between device usability and actual usage behavior in areas, including mobile banking (Gu, Lee & Suh, 2009), mobile commerce (Cyr, Head & Ivanov, 2006; Kowatsch, & Maass, 2010), ticketing service (Mallat et al., 2008), e-learning (Chiu et al., 2005) and mobile payment (Lu et al., 2011). Lu & Yu-Jen (2009) have evidenced the relationship of device usability to behavioral intention in the context of mobile shopping web sites. In addition, Uden (2006) has confirmed that device usability is a determinant for the adoption of mobile learning. Uden's findings are widely reported by scholars (Chen et al., 2003; Lonsdale et al., 2004; Kukulska-Hulme, 2009; Ismail, Johari & Idrus, 2010; Liu, Li & Carlsson, 2010; Shin et al., 2011; Mtebe & Raisamo, 2014; Martin et al., 2017; Alioon & Delialioğlu, 2017).

2.5.4.6 *Interactive Learning*

Interactive learning refers to the teaching approach using information technology (Reeves & Reeves, 1997). In other words, it is a kind of learning through interaction with the help of information technology. Koole (2009) explained interactive learning played an important role in mobile learning because it facilitated student learning. There has been extensive literature which investigated learning through interaction in the past few decades. In the past, interactive learning was achieved through different class activities, including group discussion, case studies, presentations, debates, quick quizzes, role play (Pica, 1996; Wells, 1981; Bonwell & Eison, 1991; Broadhead, 2006). With the rapid development of information technology, interactive learning can be facilitated using knowledge systems (Fischer, 2001, August), multimedia technologies (Tapscott, 1996), Moodle (Wang, 2009), social media (Dabbagh & Kitsantas, 2012) and web instruction (Reeves & Reeves, 1997). In recent years, interactive learning has been widely incorporated as part of a pedagogical approach to higher education where students adapt to interactive learning using various technologies (Dabbagh & Kitsantas, 2012). Prensky (2001) explained the phenomenon was due to a new generation of students who were 'digital natives' who are accustomed to use different information technologies in their daily life and education. In other words, the new generation of students has the preference and intention to use technology to aid learning. This is supported by the arguments of

Traxler (2007) that there are close relationship between the new generation of students and the latest information technology that results in the reliance on technology in learning. The learning preference of the new generation of student has changed the mode of traditional classroom learning into techno-driven interactive learning, for instance, using online articles or news or YouTube.com videos for case studies, Facebook private groups for class activities, Moodle for course materials download & assignment submission, etc. This has resulted in the evolution of the pedagogical approach to education including the role of lecturer gradually shifting from teacher to facilitator (Lam, 2012). Furthermore, researchers and scholars have identified many advantages to the use of interactive learning, which include encouraged brainstorming, improved participation, improved learning engagement and motivation (Johnson, Ricket & Lester, 2000; Heflin, Shewmaker & Nguyen, 2017), knowledge acquisition from the internet (Andersson et al., 2012), encouraged reflection, encouraged information and knowledge sharing (Lam, 2012), improved communication and interaction, and collaboration (Cheung & Vogel, 2012). Prior studies have evidenced the significant relationship between interactive learning and the actual usage behavior in areas including online learning community (Liu et al., 2010), learning facilitation and technology (Rienties, Brouwer, & Lygo-Baker, 2013), online help (Huet et al., 2011), e-learning (Liaw, Huang & Chen, 2007; Liaw & Huang, 2013) and online dialogue (Skočaj et al., 2011). In terms of mobile learning, many scholars have evidenced the relationship between interactive learning and behavioral intention (Chen, Kao & Sheu, 2003; Uden, 2006; Hoppe et al., 2003; Buehl, 2017; Pietrobelli & Staritz, 2017).

2.5.4.7 Social presence

The concept of social presence comes from social presence theory. Social presence theory states that the social effects of a medium are based on the degree of social presence afforded by users (Short et al., 1976). Social presence is defined as “the degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships (Short et al., 1976:65)”. In other words, an effective communication requires the medium to have the proper level of interpersonal involvement and the corresponding social presence. Sallnäs et al., (2000) explained

that social presence represented how others were aware of the interaction in a communication. An example of a medium having the most social presence is face-to-face communication, whereas the least social presence is text-based communication. Recent studies reveal that social presence plays an important role in computer-mediated communication (CMC). In the study of the computer-mediated conferencing environment, Gunawardena & Zittle (1997) found that social presence was a critical factor for satisfaction and pointed out that communication system design could help improve social presence. This is supported the argument of Garrison et al., (1999) that the educational experience can be improved through three important supporting elements, namely: the social presence, cognitive presence and teaching presence in the community of inquiry over CMC. The rapid development of the internet, social media and mobile technologies has catalyzed the growth of computer-mediated communication (CMC). Today, people are engaged in CMC by using different kinds of social media available on their smartphones, for instance, Facebook, WhatsApp, Skype, WeChat, Line, ... etc. However, there are criticisms of computer-mediated communication (CMC): that it removes important information in communication like gestures, body language and facial expressions (Dix, 2009). In view of the low social presence of text-based communications, social network sites, for instance Facebook, have integrated various features into text-based communications by using various facial/graphical expressions (Emojis), audio and videos, for a higher degree of social presence (intimacy). This supports and encourages people to use Facebook as a communication medium. Furthermore, a higher degree of social presence (immediacy) results if there is a closer or better relationship between two individuals in CMC (Kehrwald, 2008). In terms of the effects of social presence on learning, prior research has evidenced that immediacy is a critical determinant in predicting student learning where task-type and people-type students are aware of the immediacy behavior of teachers (Kearney et al., 1985). Furthermore, Gorham's (1988) research study reveals the significant relationship between immediacy and both effective learning and perceptions of cognitive learning. Similar research findings are evidenced in the Christophel (1990) study that there is a high correlation between perceptions of immediacy and favorable learner outcomes. Furthermore, in the study of distance learning, prior research has revealed that student satisfaction and learning are attributed to 'teacher immediacy' in an interactive television class (Hackman and Walker, 1990). Previous research into social presence over CMC has evidenced the

positive influence of social presence on the behavioral intention to use the social network (Shin & Kim, 2008; Shen, 2012). Furthermore, recent research in mobile learning confirms the important role of social presence (Ally, 2004; Kekwaletswe & Ngambi, 2006). Prior studies have evidenced the significant relationship between social presence and actual usage behavior in areas, including e-commerce (Weisberg, Te'eni & Arman, 2011; Lu, Fan & Zhou, 2016), online recommender systems (Choi, Lee & Kim, 2011), B2C e-commerce (Gefen & Straub, 2004), web (Hassanein & Head, 2007). Besides, Tu (2002) further confirmed empirically the relationship of social presence to behavioral intention in e-learning. In terms of mobile learning, many scholars have evidenced the relationship between interactive learning and behavioral intention (Biocca, Harms & Burgoon, 2003; Shin et al., 2011; Smith & Sivo, 2012; Mtebe & Raisamo, 2014; Richardson et al., 2017).

2.6 Research gaps

The above discussions have evidenced that mobile learning using Facebook has increasingly become an important area in student learning engagement. Though many scholars and practitioners explored mobile learning (Huang, Lin & Chuang, 2007; Wang, Wu & Wang, 2009; Liu, Han, & Li, 2010; Cheon et al., 2012; Yang, 2013; Cheung, 2013; Hao, Dennen & Mei, 2017), Facebook (Chiu & Lee, 2011; Suki, Ramayah & Ly, 2012; Yang & Lin, 2011; Salim, 2012; Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014), there are few empirical studies investigating the factors influencing Facebook for mobile learning in the higher education in Hong Kong.

Though some researchers used different technology acceptance models to conduct empirical studies on mobile learning in different contexts, there is insufficient evidence that the technology acceptance models could be applied perfectly to all different contexts. Some major predictors, including facilitating conditions and social influences, fail to influence the adoption of mobile learning in empirical studies (Yang, 2013; Cheon et al., 2012; Wong, Teo & Russo, 2013; Schaper & Pervan, 2007; Park, Yang & Lehto, 2007; Carlsson et al., 2006). Similar issues have arisen in the empirical study of the adoption in Facebook for learning (Salim, 2012; Cheung, Chiu & Lee, 2011; Suki, Ramayah & Ly, 2012). Besides, mobile learning is highly

facilitated by the power of the mobile device or smartphone, the features of the mobile device may affect the success of mobile learning (Koole, 2009). However, there is limited research exploring the factors of Interactive Learning and Device Usability (Koole, 2009; Cheung, 2013).

Figure 2.1 shows the research gap. There are three major research areas of mobile learning, i.e. (1) authentic & situated learning, (2) collaboration, (3) teaching & learning support and (4) behavior. Past literature focused on authentic & situated mobile learning includes (a) Authentic learning (Herrington & Herrington, 2007), (b) Web 2.0 mobile framework (Cochrane, 2012), (c) Transfer the mobile framework (Cochrane & Withell, 2013), (d) Web 2.0 & mobile learning (Waycott and Kennedy, 2009), (e) Student attitude to mobile learning (Heflin, Shewmaker & Nguyen, 2017), (f) Student motivation in mobile learning (Ciampa, 2014), (g) Factors: Socio-cultural and situated learning (Botzer & Yerushalmy, 2007). Examples of collaborative mobile learning are (a) Collaborative learning model (Cruz-Flores & Lopez-Morteo, 2008), (b) Model for mobile learning in distance education (Park, 2011), (c) Mobile web 2.0 framework (Cochrane & Bateman, 2013) and (d) Student motivation in mobile learning (Ciampa, 2014). There are five studies belonging to teaching and learning support in mobile learning, i.e. (a) Student-centered learning (Low & O'Connell, 2006), (b) Blended mobile learning (Chilcott & Hadfield, 2009), (c) Peer-to-peer mobile learning model (Yao, 2010), (d) A success model for mobile learning (Elmorshidy, 2013) and (e) Individual & peer learning support (Cheng et al., 2011). In terms of behavioral study, there are studies including (a) Age & gender difference in mobile learning adoption (Wang et al., 2009), (b) M-learning acceptance (Liaw et al., 2010), (c) M-learning adoption model (Liu et al., 2010) and (d) Mobile learning acceptance (Hao, Dennen & Mei, 2017). Regarding social media, there are two major research areas, i.e. (1) learning and (2) benefit, concern and other issues. Example of research studies in social media learning are (a) Personal learning environment (Dabbagh & Kitsantas, 2012), (b) Health communication (Moorhead et al., 2013), (c) Teaching crowds (Dron & Anderson, 2014), (d) Governance challenge (Obar & Wildman, 2015) and (e) Student learning styles (Balakrishnan & Gan, 2016). In terms of the benefit, concern and issues about social media, there are research studies like (a) Challenges and opportunities (Kaplan & Haenlein, 2010) and (b) Social fake news (Allcott & Gentzkow, 2017).

There are extensive literatures studying either mobile learning or social media. However, in view of the popularity of social media and smartphone as well as students' engagement on social media and mobile devices, scholars have started to investigate mobile learning using social media. There are two major research areas, namely, (1) benefit and concern and (2) technology adoption. Examples of research study about the benefit and concern of mobile learning using social media are (a) issues (Sobaih et al., 2016), (b) student perspectives (Gikas & Grant, 2013), (c) influencers and trends (Shen, Kuo & Ly, 2017) and (d) Learning attention (Drigas et al., 2014). In terms of technology adoption using social media for mobile learning, there are some studies, for instance, (a) Mobile learning acceptance (Sharma, Sarrah & Al-Shihi, 2017) and (b) User behavior (Ray & Saeed, 2015). However, there are few studies focused on the technology adoption of Facebook for mobile learning. Therefore, it is necessary to address this research gap in order to investigating the factors influencing the student adoption of mobile learning using social media. The research findings are very important because these can help teachers understand how to implement mobile learning via social network successfully.

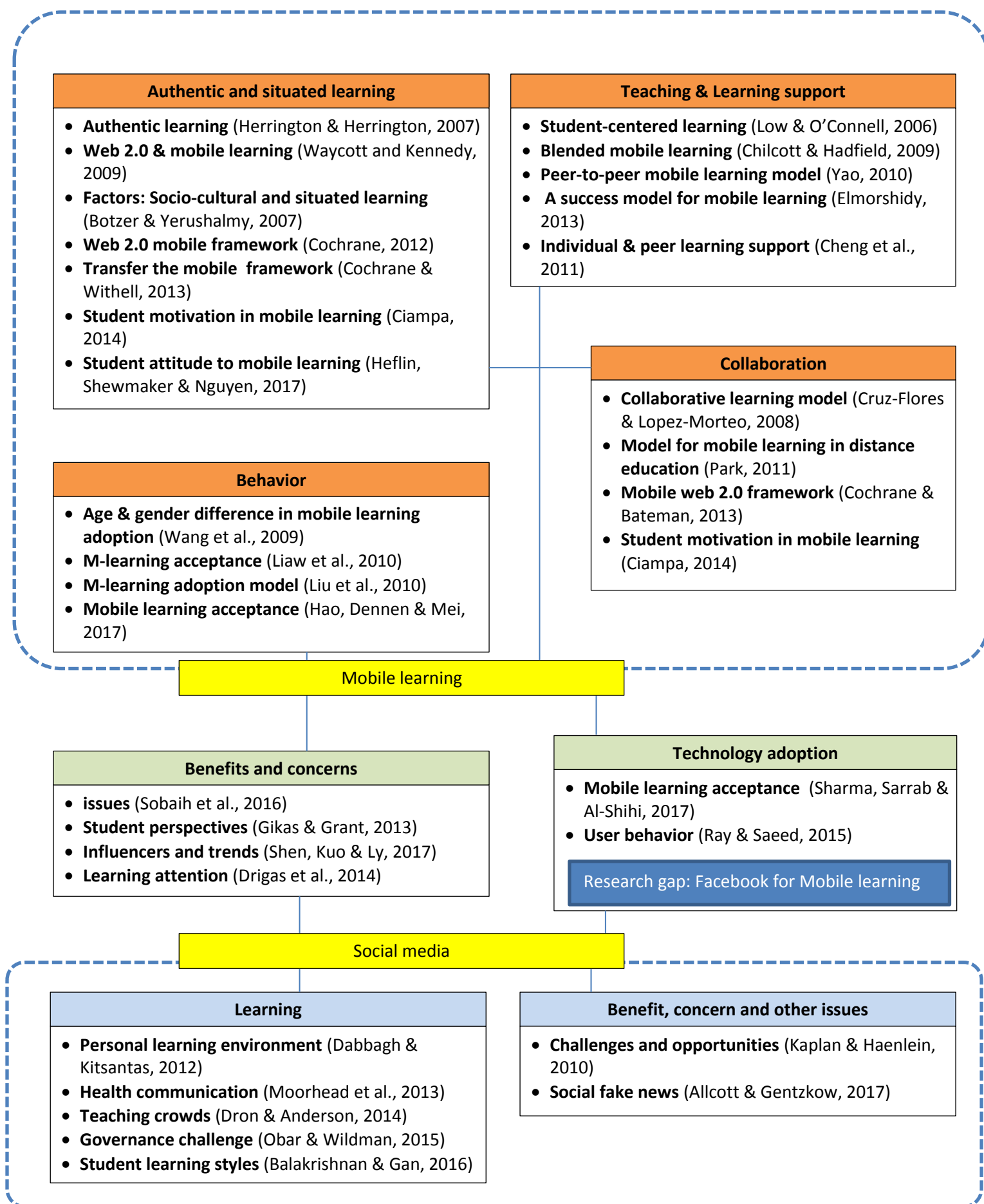


Figure 2.1 shows the research gap

For the purpose of discussion in this study, the researcher has adopted seven common but important determinants to investigate their relationships with behavioral intention. These seven determinants have been widely tested in technology adoption research and confirmed by practitioners and scholars, namely, performance expectancy, effort expectancy, hedonic motivation, habit, social presence, interactive learning and device usability. Performance expectancy is chosen because of its strong behavioral intention predicting power in the prior literature (Chiu & Wang, 2008; Lee et al., 2011; Paola et al., 2011, Bakar et al., 2013; Oshlyansky et al., 2007; Tan, 2013; Shin & Kim, 2008; Cheung & Vogel, 2013; Wang et al., 2009). Similarly, effort expectancy is chosen because prior literature has evidenced its strong behavioral intention predicting power (Chiu & Wang, 2008; Lee et al., 2011; Paola et al., 2011, Bakar et al., 2013; Oshlyansky et al., 2007; Tan, 2013; Shin & Kim, 2008; Cheung & Vogel, 2013). Hedonic motivation is chosen because scholars have evidenced its increasingly important role in mobile learning (Huang, Lin & Chuang, 2007; Wang, Wu & Wang, 2009; Liu, Han, & Li, 2010; Cheon et al., 2012; Yang, 2013; Cheung, 2013) and Facebook (Chiu & Lee, 2011; Suki, Ramayah & Ly, 2012; Yang & Lin, 2011; Salim, 2012; Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014). In view of the growing popularity of smartphones and social media (Pew Research Center, 2015a-e), the use of Facebook and smartphones has become a habitual action in students' daily lives (Giannakos et al., 2013; Perlow, 2012). Besides, prior studies have evidenced the significant relationship between habit and the actual usage behavior in areas including Facebook (Giannakos et al., 2013) and smartphones (Perlow, 2012), taobao.com (Pahnila et al., 2011), sporadic-use IT (Wilson et al., 2010), mobile payments (Dahlberg & Öörni, 2007), airline e-commerce (Rodríguez & Trujill, 2013) and learning management software (Raman & Don, 2013). Therefore, it is reasonable to include habit as one of the determinants in this study. Social presence is chosen because scholars like Cheung et al., (2011) evidenced that social presence exhibited the strongest predicting power on students' intention to use Facebook for learning. Interactive learning and device usability are chosen because the mobile device or smartphone plays an important role in mobile learning (Koole, 2009, Cheung, 2013). Therefore, this study (1) addresses the absence of research into the adoption of Facebook for mobile learning in the context of Hong Kong by examining the critical determinants which are identified in past literature, including: habit, performance expectancy, effort expectancy, hedonic motivation, device usability, interactive

learning and social presence; (2) contributes to the body of literature about the blend of teaching and learning using Facebook and smartphones in order to facilitate student learning; (3) clarifies the concerns of some researchers about the appropriateness of using social network sites for learning purposes; and (4) discusses business opportunities for mobile learning in higher education in Hong Kong.

3 Literature synthesis and generation of hypotheses

This chapter brings the various areas covered by the literature together so as to develop the basic research theory of this study. This chapter has three sections, namely, (1) conceptualization of mobile learning, (2) mobile learning and student engagement and (3) factors influencing students' adoption of Facebook for mobile learning.

3.1 Literature synthesis

3.1.1 Conceptualization of mobile learning

The emergence of personal digital assistants (PDAs) has enabled scholars and practitioners to consider the educational opportunities in education. A PDA is a handheld PC which is a pocket-sized mobile device with wireless connectivity, a web browser and touchscreen features. The PDA is regarded as the predecessor of the smartphone (Viken, 2009; Smith & Wempen, 2011). The term 'mobile learning' appeared in the 2000s when scholars started to use mobile devices, for instance, Palm, for learning purposes (Soloway et al., 2000). However, the simple definition of mobile learning, i.e. "using a mobile device for learning" has triggered many discussions among practitioners and scholars. Based on the mobile learning practices of practitioners and scholars, Naismith et al. (2004) summarized and suggested six broad theory-based categories for activity-centered mobile learning, i.e. (1) behaviorist, (2) constructivist, (3) situated, (4) collaborative, (5) informal and lifelong, and (6) learning & teaching support. This provides clear guidance for researchers and practitioners in the research into and practice of mobile learning. After years of discussions among scholars, Sharples, Taylor, and Vavoula (2007) formally defined mobile learning as "a contextual and informal learning which it features the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies (Sharples, Taylor, and Vavoula, 2007: 225)". The definition of mobile learning keeps changing because mobile learning is still in its embryonic stage and is driven by changing mobile technologies (Goh, 2006). For the past decade, scholars have tried to refine the definition of mobile learning. Wang, Wu & Wang (2009), based on latest mobile technologies, redefined mobile learning as "the delivery of learning to students anytime and anywhere through the use of

wireless internet and mobile devices, including mobile phones, personal digital assistants (PDAs), smartphones and digital audio players. (Wang, Wu & Wang, 2009:93)”. Wang, Wu & Wang’s definition emphasizes that learning can occur anywhere, anytime and be supported by a variety of mobile devices. Cochrane (2010) further refined the definition of mobile learning as “the use of wireless-enabled mobile digital devices (wireless mobile devices [WMDs]) within and between pedagogically designed learning environments or contexts. From an activity theory perspective, WMDs are the tools that mediate a wide range of learning activities and facilitate collaborative learning environments (Cochrane, 2010:3)”. Cochrane’s definition of mobile learning has echoed the arguments about mobile learning which was characterized in terms of spontaneous, portal, situated, context aware because of the high usability of mobile devices including (1) connected, (2) personalized and (3) interactive functions. This study aims to investigate students’ adoption of mobile learning, i.e., students were instructed to use their smartphone to access online course materials and participate in online learning activities (The details of course arrangement are stated in sections 5.2 and 5.3). Thus, drawing from the definitions of scholars and for the purpose of this study, the researcher adopts the definition of mobile learning as follows:

“The delivery of learning to students anytime and anywhere through the use of a smartphone”

3.1.2 Factors influencing students’ adoption of Facebook for mobile learning

Drawing on the previously reviewed literature on seven determinants, namely, performance expectancy, effort expectancy, habit, hedonic motivation, social presence, interactive learning and device usability, the literature is summarized as follows.

3.1.2.1 *Performance expectancy*

Venkatesh et al. (2003) have shown that performance expectancy is an important construct to predict behavioral intention to use certain technology or systems. Performance expectancy is integrated as one of the major constructs in the UTAUT (Venkatesh et al., 2003) and UTAUT2 (Venkatesh et al., 2012). Venkatesh et al.

(2012) defined performance expectancy as "The degree to which using a technology will provide benefits to consumers in performing certain activities (Venkatesh, Thong & Xu, 2012:159)". Performance expectancy is developed based on five important components, namely, outcome expectation, extrinsic motivation, relative advantage, usefulness perceptions, and job-fit (Venkatesh et al., 2003). The significant relationship between performance expectancy and adoption of different technologies has been extensively validated, for instance, web-based learning (Chiu & Wang, 2008), e-learning system (Lee et al., 2011), educational portal (Paola et al., 2011), student portal (Bakar et al., 2013), e-learning websites (Tan, 2013); Web 2.0 collaborative technologies (Cheung & Vogel, 2013); learning management software (Raman & Don, 2013), mobile payment (Morosan, 2016), internet banking (Arenas-Gaitán et al., 2015) and social recommender systems (Oechslein, Fleischmann & Hess, 2014). The relationship of performance expectancy to behavioral intention is supported by the empirical studies by Carlsson et al. (2006) and Park, Yang & Lehto (2007). Their results were focused on the acceptance of mobile technologies. Besides, Wang, Wu & Wang (2009) have concluded that performance expectancy is a major determinant for the adoption of mobile learning. It has been widely reported by scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014). Further, Salim (2012) and Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano (2014) have confirmed the relationship of performance expectancy to behavioral intention in the context of Facebook. Therefore, it is reasonably inferred that performance expectancy is associated with the behavioral intention to use Facebook private study groups for mobile learning. The following hypothesis is proposed.

H1: Performance expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

3.1.2.2 Effort expectancy

Effort expectancy is one of the major constructs to predict behavioral intention to use a certain technology or system (Venkatesh et al., 2003). It is integrated as one of the major constructs in the UTAUT (Venkatesh et al., 2003) and UTAUT2 (Venkatesh et al., 2012). Effort expectancy is defined as "The degree of ease associated with consumers' use of the system (Venkatesh, Thong & Xu, 2012:159)". Empirical studies have been conducted by scholars to validate the relationship between effort expectancy and behavioral intention using different technologies, including, e-government (Van Dijk, Peters & Ebbers, 2008), online question/answer service (Deng, Liu & Qi, 2011), mobile payment (Morosan, 2016), internet banking (Arenas-Gaitán et al., 2015), educational portal (Paola et al., 2011), student portal (Bakar et al., 2013), e-learning websites (Tan, 2013); Web 2.0 collaborative technologies (Cheung & Vogel, 2013); learning management software (Raman & Don, 2013), and social recommender systems (Oechslein, Fleischmann & Hess, 2014). In terms of the adoption of mobile technologies, Gao and Deng (2012 June) have empirically studied the relationship of effort expectancy to behavioral intention to adopt a mobile e-book. Samudra & Phadtare (2012) have investigated the relationship in the context of mobile banking in Pune City. Zhang, Huang & Chen (2010) have examined the relationship in mobile searches. Wang, Wu & Wang (2009) have concluded that effort expectancy is a major determinant for the adoption of mobile learning. It has been widely reported by scholars (Thomas, Singh & Gaffar, 2013; Yang, 2013; Cheon et al., 2012; Nassuora, 2012; El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Slade et al., 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014). Further, Salim (2012) and Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano (2014) have confirmed the relationship of performance expectancy to behavioral intention in the context of Facebook. On that basis, it is reasonably deduced that there is an association between effort expectancy and behavioral intention to use Facebook private groups for mobile learning. Therefore, the following hypothesis is proposed.

H2: Effort expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

3.1.2.3 Hedonic motivation

From the motivation perspective, hedonic motivation is about the influence of people's pleasure and pain and the subsequent desire to achieve a goal or move away from risk (Ahtola, 1985; Higgins, 2006). In terms of technology acceptance, hedonic motivation refers to the "the fun or pleasure derived from using a technology" (Venkatesh, Thong & Xu, 2012:161). Venkatesh et al. (2003) have shown that hedonic motivation is one of the main constructs to predict behavioral intention to use certain technologies or systems. The significant relationship between hedonic motivation and adoption of different technologies has been extensively tested, for instance, learning management software (Raman & Don, 2013), online purchasing of tickets for low cost carriers (Escobar-Rodríguez, Carvajal-Trujillo, 2014), Facebook (Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014), decision support systems (Kim, Kim & Wachter, 2013), information systems (Wang & Scheepers, 2012), healthcare web (Slade, Williams & Dwivedi, 2013, March), online hotel reservations (Mäntymäki & Salo, 2013), e-learning based on cloud computing (Nguyen, Nguyen & Cao, 2014, April), mobile shopping (Yang & Forney, 2013), online shopping (Childers et al., 2002; To, Liao & Lin, 2007; Ha & Stoel, 2009), hedonic information systems (Van der Heijden, 2004), computers (Fagan et al., 2008) and mobile services (Nvsveen et al., 2005). The relationship of hedonic motivation to behavioral intention is supported by the empirical studies by Liu, Li & Carlsson (2010) and Kang et al. (2015). Their results were focused on the acceptance of mobile technologies. Yang (2013) has concluded that hedonic motivation is a main determinant for the adoption of mobile learning. It has been widely reported by scholars (Huang, Lin & Chuang, 2007; Cheon et al., 2012; Bere, 2014 April; Lowry et al., 2012; Tarhini, Mohammed & Maqableh, 2016, El-Masri & Tarhini, 2017). Further, Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano (2014) have confirmed the relationship of performance expectancy to behavioral intention in the context of Facebook. On that basis, it is reasonably expected that there is an association between hedonic motivation and intention to use Facebook private groups for mobile learning. Therefore, the following hypothesis is proposed.

H3: Hedonic motivation will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

3.1.2.4 *Habit*

Habit is a kind of subconscious or automatic behavior, in contrast to intention which belongs to conscious behavior (Limayem & Hirt, 2003). Habits and intentions have opposite influences on actual behavior in terms of time (Triandis, 1980). In other words, the influence of intentions decreases over time whereas the effect of habits increases correspondingly. The changing influence over time is due to the increase in an individual's experience. Given students are instructed to use certain technologies to assist learning; they would use technologies automatically over time because they realize that the technologies can facilitate their learning (Limayem & Hirt, 2003). Venkatesh et al. (2003) have shown that habit is one of the major constructs to predict behavioral intention to use certain technologies or systems. Empirical studies have been conducted by scholars to validate the relationship between habit and behavioral intention using different technologies, including, taobao.com (Pahnila et al., 2011), ebay.com (Pahnila, Siponen & Zheng, 2011); sporadic-use IT (Wilson et al., 2010), mobile payments (Dahlberg & Öörni, 2007), airline e-commerce (Rodríguez & Trujillo, 2013), CASE tools (Marcinkowski, & Wrycza, 2015), online purchasing tickets for low cost carriers (Escobar-Rodríguez, Carvajal-Trujillo, 2014), social media (Suryana, 2014), Mobile device (Van Winkle et al.) and learning management software (Raman & Don, 2013; Lam, 2015). Cheon et al., (2012) have concluded that habit is a major determinant for the adoption of mobile learning. It has been widely reported by scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014). Further, Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano (2014) have confirmed the relationship of performance expectancy to behavioral intention in the context of Facebook. On that basis, it is reasonably expected that there is an association between habit and intention to use Facebook private groups for mobile learning. Therefore, the following hypothesis is proposed.

H4: Habit will be positively associated with actual use of Facebook private groups for mobile learning.

3.1.2.5 *Device usability*

In terms of mobile learning, the smartphone is one of the most common portable devices used by students to assist learning where a teacher makes use of various applications available from the phone to facilitate learning. This is reflected by the degree of device usability. Therefore, this research includes device usability as one of the constructs for further investigation. A device is said to have usability if (1) it can be used efficiently, (2) it can be learned easily and (3) it can satisfy user requirements and meet their expectations (Nayebi, Desharnais & Abran, 2012, April). One of the reasons behind the growing popularity of smartphones around the world is that the function of a smartphone is comparable to a computer. Furthermore, a smartphone has bundled with it (a) wireless connectivity, (b) calendar, (c) calculator, (d) camera, and (e) video & audio recorder so that it can empower the consumer. In recent years, usability is referred to as a collective concept of effectiveness, efficiency, satisfaction, security and ease of learning (Abran et al., 2003; Abran et al., 2003 April). As smartphones are used for mobile learning in this study, their usability towards behavioral use is our main concern. Duh et al., (2006) have the same arguments that user friendliness and usability can help design a smartphone which can reduce psychological and physiological stress, improve the learning curve, improve the user's ability to operate the device, and hence improve the overall smartphone quality. Cyr, Head & Ivanov (2006) have shown that device usability is one of the major constructs to predict behavioral intention to use a mobile device. Empirical studies have been conducted by scholars to validate the relationship between device usability and behavioral intention in different contexts, including, mobile banking (Gu, Lee & Suh, 2009), mobile commerce (Cyr, Head & Ivanov, 2006; Kowatsch, & Maass, 2010), ticketing service (Mallat et al., 2008), e-learning (Chiu et al., 2005) and mobile payment (Lu et al., 2011). The relationship of device usability to behavioral intention is supported by the empirical studies by Lu & Yu-Jen (2009) in the context of mobile shopping web sites. Uden (2006) has concluded that device usability is a determinant for the adoption of mobile learning. It has been widely reported by scholars (Chen et al., 2003; Lonsdale et al., 2004; Kukulska-Hulme, 2009; Ismail, Johari & Idrus, 2010; Liu, Li & Carlsson, 2010; Shin et al., 2011; Mtebe & Raisamo, 2014). Further, Hart et al. (2008) and Hoehle, Zhang & Venkatesh (2015) have confirmed the relationship of device usability to behavioral intention in the context of Facebook. Thus, it is

reasonably inferred that device usability is associated with the intention of using Facebook private study groups for mobile learning. Therefore, it is reasonably expected that there is an association between device usability and intention to use Facebook private groups for mobile learning. Therefore, the following hypothesis is proposed.

H5: Device usability will be positively associated with actual use of Facebook private groups for mobile learning.

3.1.2.6 Interactive learning

Interactive learning is increasingly playing an important role in education because it can motivate students to learn. With the rapid proliferation of internet and mobile technologies, interactive learning is accomplished through the use these technologies (Reeves & Reeves, 1997). Researchers and scholars have identified many advantages to the use of interactive learning, which include encouraged brainstorming, improved participation, improved learning engagement and motivation (Johnson, Ricket & Lester, 2000; Heflin, Shewmaker & Nguyen, 2017), knowledge acquisition from the internet (Andersson et al., 2012), encouraged reflection, encouraged information and knowledge sharing (Lam, 2012), improved communication and interaction, and collaboration (Cheung & Vogel, 2012). Liaw (2008) has shown that interactive learning is one of the main constructs to predict behavioral intention to use a mobile device. Empirical studies have been conducted by scholars to validate the relationship between interactive learning and behavioral intention in different contexts, including online learning community (Liu et al., 2010), learning facilitation and technology (Rienties, Brouwer, & Lygo-Baker, 2013), online help (Huet et al., 2011) and online dialogue (Skočaj et al., 2011). The relationship between interactive learning and behavioral intention is supported by the empirical studies by Liaw, Huang & Chen (2007), and Liaw & Huang (2013) in the context of e-learning. Cheon et al., (2012) have concluded that interactive learning is a major determinant for the adoption of mobile learning. It has been widely reported by scholars (Chen, Kao & Sheu, 2003; Uden, 2006; Hoppe et al., 2003). Besides, Manca & Ranieri (2013), Rienties, Brouwer, & Lygo-Baker (2013) and Yang & Lin (2011) have confirmed the relationship

between device usability and behavioral intention in the context of Facebook. Thus, it is reasonably inferred that interactive learning is associated to the intention to use Facebook private study groups for mobile learning. On that basis, it is reasonably expected that there is an association between interactive learning and the intention to use Facebook private study groups for mobile learning. Therefore, the following hypothesis is proposed.

H6: Interactive learning will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

3.1.2.7 Social presence

Social presence refers to “the degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships (Short et al., 1976)”. It is increasingly important in education because the new generation of students commonly use different kinds of computer-mediated communication (CMC), for instance, Facebook, WhatsApp, Skype, etc. for daily communication where students are aware of the interaction in communications (Sallnäs et al., 2000). In addition to traditional communication channels, for instance, email and discussion forums, there are trends that student-student and teacher-student communication are changing to instant messaging, for instance, Facebook, WhatsApp, Skype, etc. The phenomenon can be explained by the fact that better communication systems can improve social presence and hence user satisfaction (Gunawardena & Zittle, 1997). Cheung, Chiu & Lee (2011) have shown that social presence is one of the main constructs to predict behavioral intention to use Facebook. The significant relationship between social presence and adoption of different areas has been extensively tested, for instance, e-commerce (Weisberg, Te'eni & Arman, 2011; Lu, Fan & Zhou, 2016), online recommender systems (Choi, Lee & Kim, 2011), B2C e-commerce (Gefen & Straub, 2004), and web (Hassanein & Head, 2007). The relationship of social presence to behavioral intention is supported by the empirical studies by Tu (2002) in the context of e-learning. Tan et al., (2012) have concluded that social presence is a major determinant for the adoption of mobile learning. It has been widely reported by scholars (Biocca, Harms & Burgoon, 2003; Shin et al., 2011; Smith & Sivo, 2012; Mtebe & Raisamo, 2014). On that basis, it is reasonably expected that there is an association between

social presence and the intention to use Facebook private study groups for mobile learning. Therefore, the following hypothesis is proposed.

H7: Social presence will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

Based on the literature synthesis, there are seven hypotheses to be investigated as to their associations with behavioral intention to use Facebook private study groups for mobile learning. Figure 3.1 shows the theoretical framework for this mobile learning study.

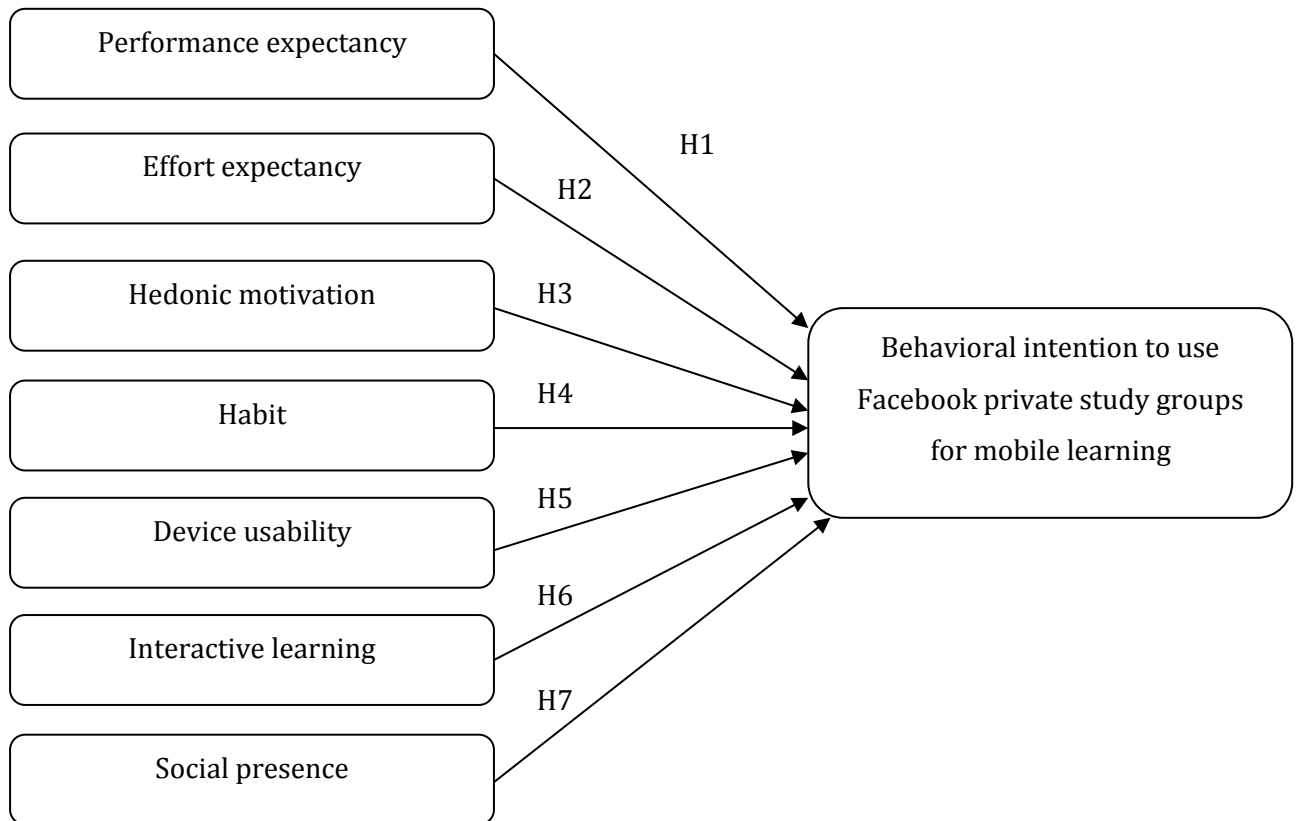


Figure 3.1: The theoretical framework for this mobile learning study.

4 Research methodology

This chapter provides an overview of the research methodology being used in this research. This chapter is important because it explains how the research methodology is decided in order to address the research questions of this study, i.e. are (1) What are the determinants influencing students' adoption of Facebook private study groups for mobile learning within higher education in Hong Kong? (2) Are there any gender or age differences in adoption of Facebook private study groups for mobile learning? (3) Is there any additional determinant that is important to student adoption of Facebook private study groups for mobile learning? (4) Why do students use Facebook? (5) Why do students use smartphone? (6) What are the advantages and concerns of using Facebook for mobile learning? This includes a discussion about the (1) research paradigm, (2) research approach, (3) research strategy, (4) research strategy, (5) research design, and (6) time horizon. In this research, a mixed method is used which includes both quantitative and qualitative research. Therefore, the data collection and analysis of quantitative and qualitative research are discussed in chapters 5 and 6 respectively. Figure 4.1 shows a high-level diagram that illustrates the complete methodology undertaken by the research. Research methodology requires a careful consideration of the research philosophy, research approaches, research strategies, time horizons and data collection methods (Saunders, Lewis & Thornhill, 2012). Figure 4.2 shows the research methodology in a process approach.

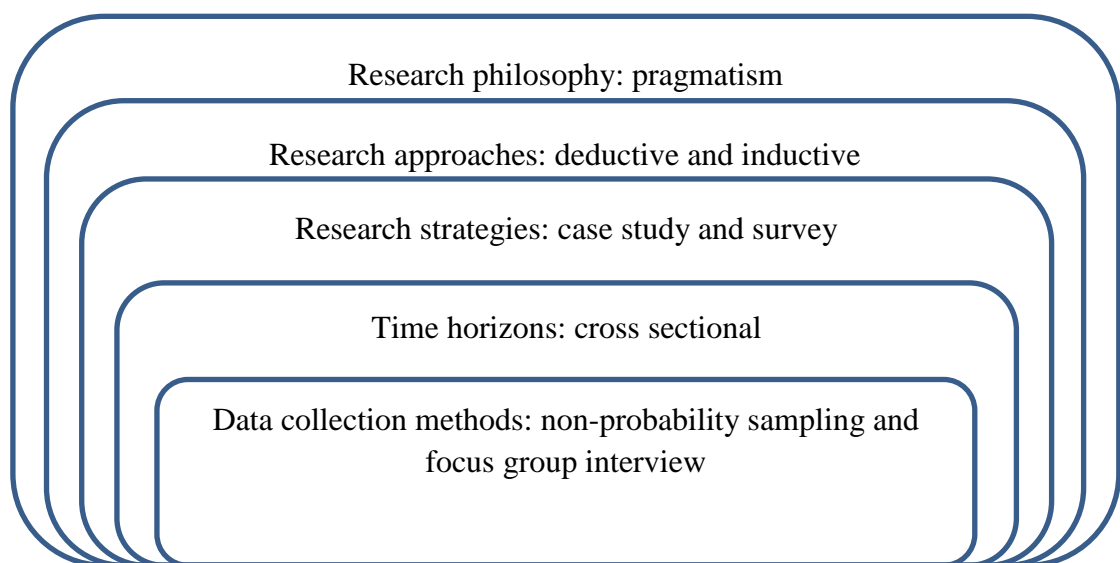


Figure 4.1: A high-level diagram that illustrates the complete methodology undertaken by the research.

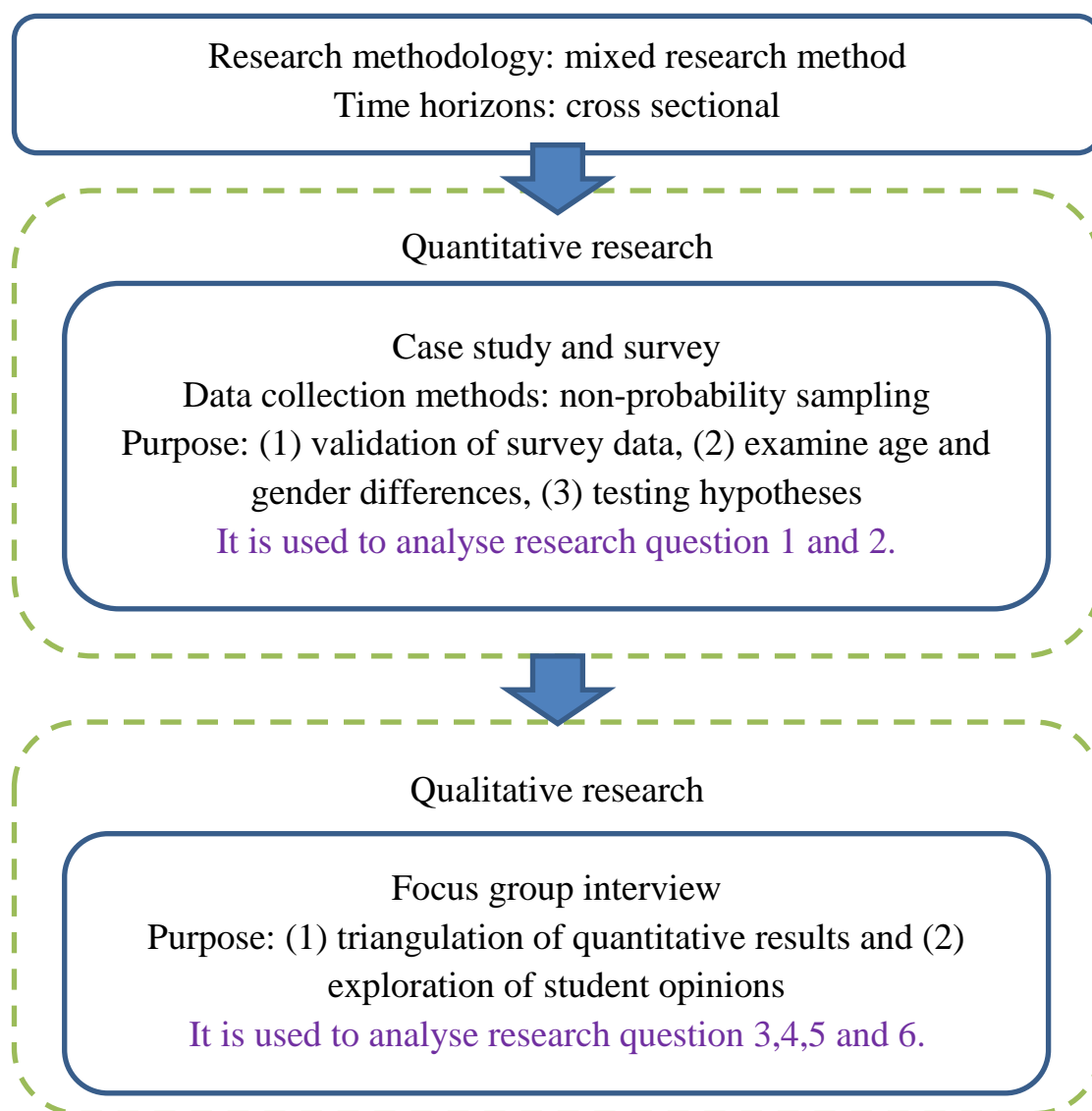


Figure 4.2: The research methodology in a process approach.

4.1 Research paradigm

Research is defined as an inquiry or investigation by collecting, analyzing and interpreting data systematically (Burns, 1997). The purpose of research is to understand a psychological phenomenon or strengthen the knowledge of an individual in a certain context (Mertens, 2005). The theoretical framework is a research paradigm because it affects how knowledge is understood and interpreted (Mackenzie & Knipe, 2006). A research paradigm is defined as a set of values and beliefs relating

to research that governs how the researcher conceptualizes and explains phenomena, including research subjects (Kuhn, 1962). The research paradigm is crucial to framing research questions, which help to clarify our research idea, field and area of focus. Research methodology cannot be chosen if the research paradigm is not decided (Mackenzie & Knipe, 2006). There are three characteristics describing a research paradigm, namely, ontology, methodology and epistemology. Ontology is about something that exists in nature and waits to be found. Epistemology is about how researchers perceive the knowledge they discover. Methodology is about how researchers find the knowledge and conduct their research (Guba, 1990). Ontology and epistemology are important because they provide a holistic view about knowledge and how to relate ourselves to the knowledge. Epistemology exists in the form of a continuum from objectivism to subjectivism (Huglin, 2003). Different research paradigms bear different ontology, epistemology and methodologies. The choice of research paradigms (1) reflects the researcher's view about reality and how to know reality, and (2) affect the subsequent research methodologies. There are many different types of research paradigms, namely positivism, post-positivism, constructivism, phenomenology, transformativism and pragmatism (Morgan, 2007).

4.1.1 Positivism

Positivism is a research philosophy that understands the knowledge objectively using scientific methods, for instance surveys, statistics and experiments. It is a deterministic philosophy that emphasizes causal relationships (Creswell, 2003). Positivists see research around the world objectively and do not include their values in the research. Positivists believe that most of the research can be observed and measured with an objective approach. If research phenomena behavior is regular, causal relationships between variables will be established and generated. This approach aligns with the deductive and quantitative research method. Therefore, positivism is widely used in contemporary business and management research (Mackenzie & Knipe, 2006). Empiricism and objectivism are synonymous with positivism (Huglin, 2003). Although positivism belongs to a scientific method of research, it has been criticized by other researchers. The criticisms include (i) reducing problems into certain measurable, quantifiable variables means that some of them may be overlooked; (ii) measuring variables objectively, but not all variables

can be measured objectively; (iii) failing to handle a large number of variables given limited sample sizes; and (iv) generalizing the result from a controlled environment to the real environment (Gay, Mills & Airasian, 2011; Donaldson, 1996).

4.1.2 Constructivism

Constructivism (also called Interpretivism) is the research philosophy which originated from the study of phenomenology and hermeneutics, i.e. interpretive understanding, by philosophers. Constructivism/Interpretivism is intended to understand human experience in the world and proposes the socially constructed nature of reality (Mertens, 2005). Phenomenology and subjectivism are synonymous with constructivism (Huglin, 2003). The constructivists/interpretivists believe that their experiences and background and the situational views of participants in the research are important in research. Constructivists attempt to develop a theory inductively instead of beginning research using an existing theory. Therefore, constructivists always collect and analyze data qualitatively or both qualitatively and quantitatively. The purpose of quantitative data analysis is to validate the qualitative findings (Creswell, 2003). This approach aligns with the inductive and qualitative research method. In spite of Constructivism/Interpretivism providing different points of view about reality and individuals becoming active and important in research, it has been criticized by other researchers. One criticism is that it is difficult to identify right or wrong (Feyerabend, 1975). Moreover, it is criticized in that there is usually not a scientific method to validate the qualitative data (Sandelowski, 1986).

4.1.3 Pragmatism

Unlike positivism and constructivism, pragmatism does not belong to any philosophy system or reality. Pragmatists attempt to investigate the ‘what’ and ‘how’ problem of the research (Creswell, 2003). Early pragmatism made use of social inquiry to understand reality rather than scientific method (Mertens, 2005). Over time, pragmatism has changed and now involves using mixed methods of research to investigate the philosophical framework (Somekh & Lewin, 2005). It seems that mixed methods of research can be used in any paradigms; pragmatism differs from other paradigms in that it focuses on the research problem and tries to understand it

using various research methods (Creswell, 2003). As the research problem becomes the core focus in the research, different data collection and analysis methods can be selected as long as they can provide insights to understand or explain the question. Therefore, pragmatism is not constrained by another philosophy system or reality in the use of research methodologies (Mackenzie & Knipe, 2006).

4.1.4 Phenomenology

Phenomenology is a research paradigm which arose in the 1980s as an alternative to positivism in contemporary business and management research. The emergence of phenomenology can be attributed to the assumptions made by positivism not being applicable to business research. There are three special issues in business research. First, business research areas, for instance leadership and employee satisfaction, are not objective reality. Second, business researchers usually bring their values into their research because they decide what to observe and how to interpret the results of the research. Their values may be affected by their age, gender or social background. Third, the business researcher may affect the behavior of participants (Zikmund et al., 2013). Therefore, phenomenologists believe that social and business phenomena should be understood through a subjective approach, which inevitably requires interpretation of research results by the researcher. Phenomenology provides a more holistic view about the socially constructed world because it investigates reality from different perspectives. While positivists emphasize the separation of their values from the research, phenomenologists advocate closeness between the two (Edwards et al., 2006). In order to identify the dimensions, phenomenologists usually use various research methodologies to observe the phenomenon. This process is called triangulation. Phenomenologists can make general conclusions through inductive observation of a number of instances of the phenomenon (Lee & Lings, 2008).

4.1.5 The research paradigm in this study

The purpose of this research was to find out “What are the determinants influencing students’ adoption of Facebook private study groups within higher education in Hong Kong?” These factors were identified as measurable variables where data was collected using online surveys and analyzed statistically. Multiple linear regression is

one of the common and basic methods used to explore causal relationships. Multiple linear regression was used in this research because this research aimed to examine whether the identified independent variables were able to predict the dependent variable, i.e., the behavioral intention in this respect (Straub, Boudreau & Geffen, 2004). However, in view of the assumptions and weaknesses of positivism, mixed method research methodology was adopted in this research. This means quantitative and qualitative data were collected respectively using online surveys and focus group interviews for analysis. The purpose of qualitative data analysis is used to validate and triangulate the quantitative findings (Creswell, 2003). Because, this research attempted to examine if there were causal relationships between constructs using a mixed method approach which allows triangulation, pragmatism was adopted as the research paradigm in this research. Pragmatism has the advantage of allowing a researcher to use mixed methods to collect different data from different sources at different times to investigate and understand the same phenomenon from different perspectives (Creswell, 2003; Saunders, Lewis and Thornhill, 2012)

4.2 Research approach

There are two broad reasoning methods, namely, the inductive and deductive approaches. The two approaches have different purposes in research. The inductive research approach tends to generalize its arguments based on observation or experience, whereas deductive research tends to specialize or focus its arguments based on existing theories, laws, principles or rules. Research approaches are closely related to the research paradigm. For instance, positivism is a scientific research paradigm which requires a deductive research approach and quantitative research method to investigate the causal relationships between constructs objectively, whereas phenomenology is a kind of constructive paradigm which requires an inductive research approach and qualitative research methods to interpret and explore the socially constructed world subjectively (Soifeman, 2010).

4.2.1 Inductive approach

The inductive approach is a method of reasoning based on observation or experience. The purpose of induction is to generalize a theory in order to explain a phenomenon (Trochim, 2006; Bryman & Bell, 2011). Researchers using an inductive approach develop a theory by using the views of participants, categorizing their views into themes and relating the themes into a theory (Morse, 1991). This kind of approach is a bottom-up approach (Creswell & Plano Clark, 2007). An advantage of inductive research is that it provides a certain degree of flexibility to change in the context of less structured qualitative research. In contemporary research in business and management, the inductive approach is commonly implemented using qualitative research methodology (Bryman & Bell, 2015). One of the most famous inductive approaches is 'Grounded Theory', developed by Glaser and Strauss in 1967, where new theory is generated through systematic research (Heath & Cowley, 2004).

4.2.2 Deductive approach

The deductive approach is a method of reasoning based on scientific, logical, rational and objective methods. Unlike the inductive approach, which explores new phenomena and generates new theories, the deductive approach emphasizes the causality in research and focuses on specific knowledge (Kothari, 2004). The purpose of deduction is to develop hypotheses using existing theories so as to examine the measurable constructs and investigate the causal relationships which may support or invalidate those theories (Trochim, 2006; Silverman, 2013). Researchers using the deductive approach investigate causal relationships using the data collected from survey or statistics where the data is analyzed statistically. This kind of approach is a top-down approach (Creswell & Plano Clark, 2007). It is therefore relatively suitable to positivism, which adopts a scientific method in research. An advantage of deductive research is that (1) it provides an objective, logical and rational view about the phenomenon, and (2) it analyzes and explains the causal relationships systematically. In contemporary research in business and management, the deductive approach is commonly implemented using quantitative research methodology (Bryman & Bell, 2015).

4.2.3 The research approach in this study

As mentioned in section 4.1.5, the research paradigm adopted in this study is pragmatism, because this research wanted to find out “What are the determinants influencing students’ adoption of Facebook private study groups for mobile learning?” Thus, this research attempted to examine the causality among the constructs identified from the past literature and theories using data collected from surveys (Trochim, 2006). This research specifically focused on mobile learning using Facebook private study groups in Hong Kong. Therefore, it is a top-down approach (Creswell & Plano Clark, 2007). However, deductive and inductive methods are not mutually exclusive and can be used together. There were past research studies using quantitative research to investigate deductively the causal relationships of constructs hypothesized from existing theories and using qualitative research to validate the relationships and explore new factors to explain the phenomenon inductively (Kutney, 2006; Mertens, 2014). This kind of combination of different research methodologies to study the same phenomenon is known as triangulation (Jick, 1979). As mentioned in section 4.1.5, pragmatism was adopted in this research where mixed method research methodology was used. Thus, inductive and deductive approaches were adopted respectively in qualitative and quantitative research. Therefore, the role of quantitative research was used to identify the causal relationships among constructs whereas qualitative research was used for validating the quantitative findings and exploring new determinants that had not been addressed in quantitative research.

4.3 Research strategy

A research strategy is a research plan that assists a researcher to investigate the phenomenon under research and answer the research questions systematically (Saunders, Lewis & Thornhill, 2012). A research strategy may include different components, for instance, case studies, interviews, experimental research, literature reviews, etc. According to the research onion developed by Saunders, Lewis & Thornhill (2012), a research strategy may contain experiments, case studies, surveys, grounded theory, action research and ethnography.

4.3.1 Experimental research

Experimental research is a research strategy that designs a research process to investigate the experiment results by comparing them with the expected theoretical

results (Goulding, 2005). It is commonly used in research investigating the relationships between factors and comparing them with expected results (Cooper, Schindler & Sun, 2003).

4.3.2 Case study

A case study is a research strategy that studies the phenomenon of a certain context so as to identify the causality and propose generalizations. A case study is best used to explain a phenomenon in a specific context and helps distinguish the differences, for instance, cultural, age and gender. (Eisenhardt, 1989). Case studies are widely used in various research perspectives, especially in social sciences. Furthermore, they are used in the research of finance that the performance of two companies can be compared (Verschuren, 2003).

4.3.3 Action research

Action research attempts to address the research problem by choosing a practical approach based on the community of practice (Berg, Lune, Lung, 2004). In order to choose the optimal research approach, a reflective practice is usually used to assess systematically the practice of the professionals and the experience of the practitioners. Action research is commonly used in research into education and medical services (Zuber-Skerritt, 1992; Wang, 1999).

4.3.4 Grounded theory

Grounded theory is an inductive research method usually using qualitative research methodology in order to generate new theory systematically (Heath & Cowley, 2004). It contains a number of systematic research procedures during the theory generation. It is usually used in research in social sciences (Charmaz, 2011). A common approach in qualitative research involves collecting the views of participants in the form of transcripts, categorizing their views by coding, categorizing their views into themes and relating the themes into a theory systematically (Morse, 1991).

4.3.5 Surveys

Surveys are a research strategy used aligned with a deductive research approach and quantitative research methodology. They are usually a research strategy of positivism

because positivism is a research paradigm using scientific methods to collect and analyze data (Mackenzie & Knipe, 2006). Researchers usually design the questions in the survey based on measurable variables so that participants can express their views through the Likert scale, for instance, from strongly disagree to strongly agree. Therefore, a survey is an effective research strategy measuring the causative variables in quantitative research (Bryman & Bell, 2015).

4.3.6 Ethnography

Ethnography is a research strategy that collects data by means of observation (Jorgensen, 1989). When using ethnography, the research is conducted in an environment where a target group of people is being observed. The observer attempts to record their characteristics, behavior and interaction based on a pre-defined set of observation guidelines. The guidelines contain a set of questions asking the observer what they identify from the (1) characteristics, for instance, gender, age (2) behavior, for instance, did they do that?; (3) interaction, for instance, did they share? Ethnographic research is best used in the research of children and teenagers because it is offensive to ask children ‘yes’ or ‘no’ questions directly. Ethnography is commonly used in business research about customer or staff behavior in a restaurant or shop. Ethnography can be used in both quantitative and qualitative research depending on the data collection method (LeCompte & Schensul, 1999).

4.3.7 The research strategy in this study

This research intended to find out “What are the determinants influencing students’ adoption of Facebook private study groups within higher education in Hong Kong?” As mentioned in section 4.1.5, the major research paradigm adopted in this study is pragmatism. As mentioned in section 4.2.3, deductive and inductive approaches were used in this study. In terms of research strategy, surveys were used to collect data from participants by expressing their views voluntarily using questionnaires, whereas focus group interviews were used to collect opinions from participants in this respect. The survey questionnaire and focus group interview guided questions were designed based on the research instruments of past literature (Bryman & Bell, 2015). A case study research strategy was used in the School of Continuing and Professional Studies, The Chinese University of Hong Kong. This case study could help investigate

whether the theoretically identified constructs have causal relationships to the adoption of Facebook private study groups for mobile learning in the higher education context in Hong Kong. Most importantly, the case study could provide information about reality (Verschuren, 2003). As mentioned in section 4.1.5, a mixed method of research methodology was adopted in this research where quantitative and qualitative data were collected for analysis and validation. Thus, the survey was used in quantitative research to investigate the causality deductively and focus group interviews were used in qualitative research to validate the quantitative research findings and explore new factors inductively.

4.4 Research design

Research design refers to the research methodology used in research. There are usually two types of research design, namely, (1) mono method, and (2) multi-method. Mono method is a research design that uses either quantitative or qualitative research methodology. The choice of quantitative or qualitative research methodology is closely related to the research paradigm, research approach and research strategy adopted. For instance, a positivist may choose a deductive approach for research because positivism is a logical and rational research paradigm which understands the causal relationship of a phenomenon using scientific methods of collecting and analyzing measurable variables objectively. Furthermore, the mono method is applied to those who advocate constructivism. Multi-method is a research design which combines one or more data collection methods, for instance, quantitative & qualitative methods, quantitative & quantitative methods, qualitative & qualitative methods etc (Saunders, Lewis and Thornhill, 2012). Multi-method is different from mixed method because mixed method refers to quantitative & qualitative methods only. Researchers, who believe in pragmatism, are not restricted by any research philosophy that multi-method can be used to address the research question and investigate the same phenomenon from different perspectives. Mixed method allows collecting different types of data from different sources for different analysis. While quantitative and qualitative research methods have their own shortcomings, mixed method allows each methods to compensate for the weaknesses of the other. Furthermore, mixed method provides the feature of triangulation, where quantitative findings can be validated by qualitative results (Creswell, 2003).

In this research, mixed method research was used. Therefore, there were two stages in this research, i.e. (1) quantitative research and (2) qualitative research. The first stage is quantitative research. An online survey was used to collect data which was analyzed statistically so as to test the research hypotheses. With quantitative research methodology, data could be tested, analyzed and interpreted systematically and objectively and the hypotheses could be examined deductively (Mackenzie & Knipe, 2006). The survey was developed based on the survey instruments of past literature so as to ensure the reliability and validity of the questionnaire and allow future generalization of the research model in a similar context. However, due to the overlapping role of teacher and researcher, the effects of the teacher-student relationship on student attitudes towards the online survey had to be eliminated. Thus, the anonymous online survey was conducted after the official announcement of student final grades for the course. In other words, student final grades for the course would not be affected by whether they decided to participate in the survey or not. The online survey was composed through SurveyMonkey.com which is one of the most reliable online survey platforms widely used in academic research. SurveyMonkey.com was (1) certified private by TRUSTe, (2) accredited by BBB as A+ business, and (3) secured by McAfee, which guaranteed the data security and confidentiality collected through their online survey (Survey Monkey, 2017). Before the main online survey was conducted, a pilot study was conducted to assess if there were problems in terms of (1) understanding the survey questions in addition to basic grammatical mistakes; (2) the flow and structure of the survey questionnaire; (3) instructions and information relating to the survey. The details of the pilot study are mentioned in section 5.6.

The second stage is qualitative research. A focus group interview was conducted to collect the views of participants about the research subject. With qualitative research methodology, interview data could be analyzed systematically by coding the transcripts, categorizing the codes and grouping the categories into themes using qualitative data analysis software so that the results could be used to validate the quantitative research findings and explore new factors inductively (Hsieh & Shannon, 2005). The focus group interview open-ended guiding questions were developed based on the research instruments of past literature so as to ensure the reliability and

validity of the questions. The focus group interview invited 16 students voluntarily to participate in the interview in order to further share their views about the research subject, i.e. the adoption of Facebook private study groups for mobile learning. The focus group interview was a face-to-face interview and conducted in room 102, 1/F, Central Learning Centre, Bank of America Tower, Central.

4.4.1 The sampling method in quantitative research

There are two types of sampling method, namely probability and non-probability. Probability sampling is the sampling method in which samples are selected from the population randomly, whereas non-probability sampling is the one in which samples are selected based on the judgement of the researcher or due to the convenient proximity and accessibility to the researcher (Field et al., 2006). Since this research investigates the factors influencing the adoption of Facebook private study groups for mobile learning through case study of a course in the School of Continuing and Professional Studies, a common course, marketing, is chosen for the case study. This was chosen because it is a core course required to be studied by students of different disciplines. Students having different backgrounds learn the same knowledge with the help of mobile learning using Facebook private study. This kind of non-probability sampling method can improve the degree of generalizability and replicability of the research findings in other contexts (Creswell, 2013; Johnson and Onwuegbuzie, 2004). Therefore, marketing course students are invited to participate voluntarily in the survey. However, due to the overlapping role of teacher and researcher, the effects of the teacher-student relationship on student attitudes towards the online survey and their responses to survey questions had to be eliminated. Thus, the online survey was conducted after the official announcement of students' final grades for the course. In other words, student final grades for the course would not be affected by whether they decide to participate in the survey or not. The online survey was hosted on surveymonkey.com. An invitation letter (Appendix 2) and information sheets (Appendix 3) were sent to students by email through an email distribution list. They were given 7 days to decide if they were going to participate in the survey at week 15 and stage 2 focus group interviews. The students, who volunteered to participate in the survey, were required to read and sign the online survey consent form (Appendix 4) about the purpose of survey, the benefits and risks of participating in the survey.

4.4.2 The ethics in qualitative research

There are four ethical principles to be aware of in research, i.e. (1) autonomy, (2) beneficence, (3) non-maleficence and (4) justice (Beauchamp & Childress, 1983). Therefore, the context and topic of the research must be carefully considered. The survey and discussion questions must be carefully designed to avoid traumatizing or making participants uncomfortable. Likewise, questions related to painful, humiliating and frightening experiences should not be asked because these may increase participants' anxiety (Bricki & Green, 2007). Furthermore, (a) informed consent, (b) confidentiality, (c) security and (d) data storage and security, are important ethical issues in research. As mentioned in the previous section, participants are well-informed about (1) the purpose and background of the research, and (2) the benefits and risks of joining the survey and focus group interview. They can freely consent if they want to participate in the data collection. Written consent is used in this study in order to ensure participants understand the purpose of the research and data collection (Bricki & Green, 2007). In terms of confidentiality, as mentioned in previous sections, an anonymous survey is carried out in quantitative research and when quoting a participant's opinion directly, pseudonyms are used to ensure confidentiality (Aubusson et al., 2009). Furthermore, security is important because it is necessary to (1) ensure the safety of participants, and (2) find an appropriate private place/place with appropriate settings for surveys and interviews (Bricki & Green, 2007). In terms of data storage and data security, there are three issues to be considered, i.e. (a) how data is stored, (b) who can access the data and (c) how data can be accessed. There are two types of data, namely, (i) hard copies and (ii) computer files. Hard copies, including survey responses, transcripts, interview notes and audio tapes, must be kept in locked cabinets that can be accessed only by the research team or authorized persons. On the other hand, there are two types of computer files, i.e. identifiable data and anonymous data. According to the Data Protection Act 1998 in Scotland, England, Wales and Northern Ireland, identifiable data must be password protected or encrypted. The personal data can be accessed within a research team or by persons authorized by a gatekeeper. The Associate Director has the gatekeeper role in the School of Continuing and Professional Studies. In case of anonymous data, participants' prior consent is required before it can be shared with other researchers (Data storage and data security, 2015). The hard copies and computer files

are stored for 5 years after the award of the DBA degree. The hard copies and computer files are destroyed through Leader Data Security and Management Company whose data destruction service complies with US Department of Defense DoD standard and is recognized by the Hong Kong Environmental Protection Dept. Appendix 9 shows the approval letter from the Associate Director of the School of Continuing and Professional Studies. Appendix 10 shows the approval letter from LSBU Research Ethics Committee.

4.5 Time horizons

There are two common types of time horizons, namely, cross-sectional and longitudinal study. Cross-sectional study attempts to collect and analyze data at a single point in time. It is usually used in social science or medical research. One key feature of cross-sectional research is the comparison of different population samples at a single point in time. An example of a cross-sectional study is to compare the cholesterol levels of women aged over 40 and below 40 grouped as daily walkers and non-walkers. By contrast, a longitudinal study attempts to collect and analyze data by repeatedly observing the same subject over a certain period of time, for instance, a decade (Saunders, Lewis and Thornhill, 2012). An example of a longitudinal study is to observe the change in the cholesterol levels of women aged over 40 who walk daily over 20 years (Institute for Work & Health, 2009). Therefore, longitudinal study was inappropriate for this research because this research was not about tracking the change of constructs over a period of time, but instead, this research investigated the causal relationships between constructs. Thus, this research used cross-sectional study in order to examine the correlations between constructs at a single point in time (Saunders, Lewis and Thornhill, 2012).

5 Data collection and analysis (Quantitative research)

This chapter explains data collection and analysis in quantitative research. This includes (1) quantitative research; (2) course arrangement; (3) quantitative data analysis technique; (4) measurement development; (5) pilot study; (6) research ethics; and (7) quantitative data analysis.

5.1 Quantitative research

Quantitative research is the primary research focus where samples of the population are studied under a controlled environment in order to test the proposed hypotheses statistically and identify the simple causal relationships between relatively small numbers of variables. It is commonly used in Positivism. A positivist approach is a scientific, logical, rational and objective method of looking at research problems with the assumption that a certain reality is to be explored. In other words, the result of this positivist research approach can help validate if an existing theory is accepted or extend an existing theory subject to testing by other researchers. It can help to answer ‘How often?’ and ‘How much?’ questions. Furthermore, it is used in Pragmatism which uses mixed method research methodologies to address research questions and investigate phenomenon from different perspectives. In this research, mixed method was used so that quantitative and qualitative researches were involved (Saunders, Lewis and Thornhill, 2012).

5.2 Marketing course in Higher Diploma programme

This research aims to investigate the factors influencing student acceptance of Facebook private study groups for mobile learning in Hong Kong. Therefore, this research focuses on the application of a blended approach using Facebook private study groups for mobile learning by a case study of year one students of the Higher Diploma programme in SCS, CUHK. These students were instructed to join a Facebook private study group using their smartphone for in-class learning activities. In this research, the students studying the marketing course were invited for mobile learning via a Facebook private study group. The lessons of the marketing course were held in a normal classroom where there was no computer, laptop or mobile device provided for students. They were required to use their smartphones with

internet access either via the school WIFI or their mobile data services during lessons for mobile learning activities. The course lasts for 15 weeks (Total: 45 hours) containing 14 x three-hour lessons and 1 x three-hour final examination. In addition to the final examination which carries 50% of the total mark, the other 50% comprises continuous assessments consisting of an assignment (15%), a project (10%), a presentation (5%), course work (5%) and a mid-term exam (15%). The objectives of the marketing course are to: (i) introduce the fundamental concepts of marketing, (ii) address the issues involved in developing the marketing mix and marketing strategies, (iii) explain marketing and the marketing process, developing marketing opportunities and strategies, developing the marketing mix and managing marketing in the global marketplace, creating customer value and satisfaction. Upon successful completion of this course, the Intended Learning Outcomes for students are to: (i) understand the concept and important role of marketing in a changing world, and how marketing opportunities and strategies are developed; (ii) implement the practical knowledge in developing the marketing mix; and (iii) master the different competitive strategies in Marketing. SCS provides the learning management system (LMS), i.e. MOODLE, as e-learning support to all the courses, so that teachers can make available the course materials including PowerPoint files, tutorial notes and assignments for students to download, and they can submit their assignments in return. Teachers can make course announcements, and create forums and online quizzes on MOODLE. Furthermore, based on the course description, the course is designed to contain lectures, case discussions, project and web-based teaching as teaching and learning activities to facilitate student learning and encourage communication, interaction and collaboration. To this end, this study makes use of mobile learning by integrating smartphones and Facebook as a blended pedagogical strategy. There are two main reasons behind this blended approach. Firstly, the benefits of mobile learning using Facebook meet the requirements of the course. As evidenced from prior studies in social media and mobile learning, the benefits include improved learning convenience and flexibility (Motiwalla, 2007), improved learning engagement (Wankel, & Blessinger, 2013; Heflin, Shewmaker & Nguyen, 2017), providing an optional channel of learning (Huang, Lin & Chuang, 2007), improved learning effectiveness and outcomes (Wang, Wu & Wang, 2009; Valk, Rashid & Elder, 2010), better learning plan and path (Corlett et al., 2005), personalized learning and usage patterns (Stockwell, 2008), encouraging communication and collaboration (Kukulska-Hulme

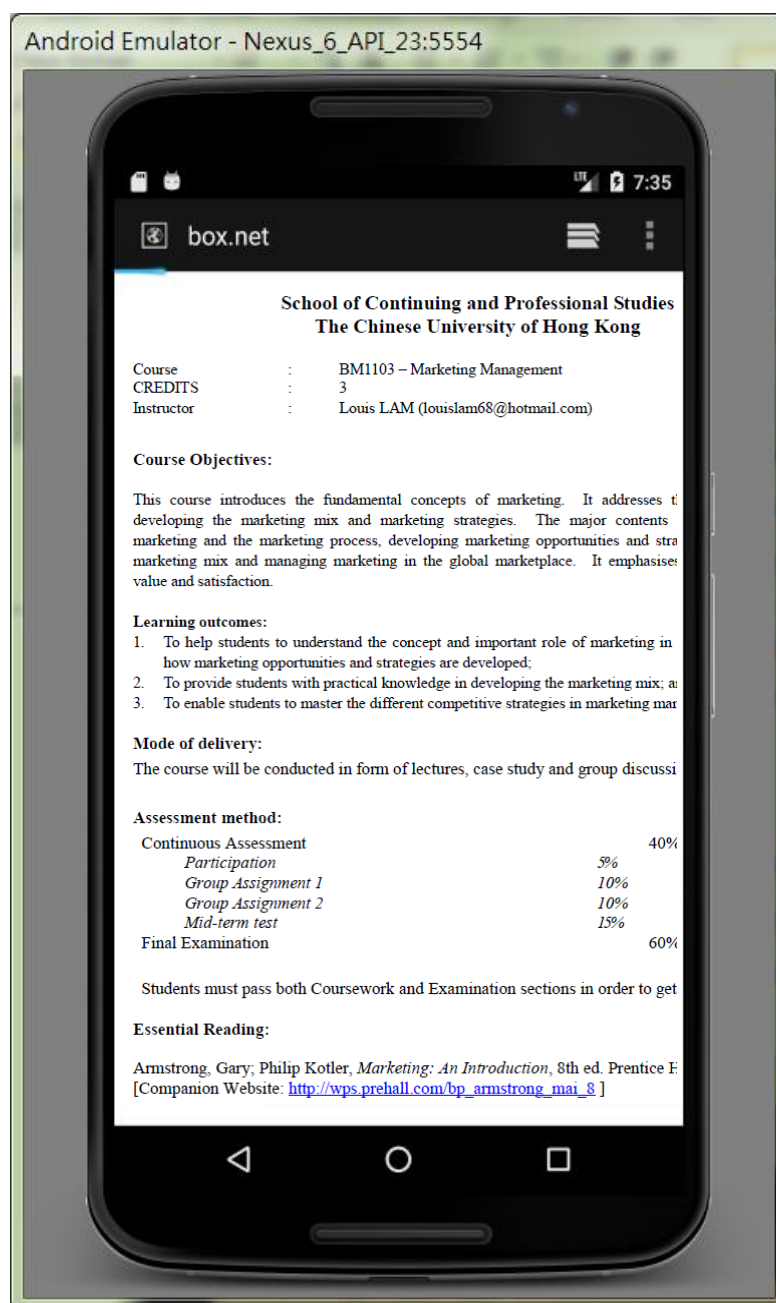
& Shield, 2008), improved learning engagement (Lam, 2012; Lau & Lam, 2012; Lam & Ng, 2015; Heflin, Shewmaker & Nguyen, 2017), improved mobility (Wang, Wu & Wang, 2009). Secondly, the features and functions of smartphones and Facebook private study groups can compensate for the weaknesses of MOODLE, including (i) poor responsive web design mobile support compared to the native Facebook mobile application, (ii) slow communication compared to Facebook instant messaging service, (iii) slow email notification compared to Facebook mobile app notification, (iv) poor interface compared to Web 2.0 Facebook interface, and (v) a poor sense of social community compared to Facebook (Roth, 2015; Vivian, 2011, July; Hurt et al., 2012; Magro et al., 2013; Hölbl & Welzer, 2015). Therefore, apart from lectures and the e-learning platform, students were instructed to use their smartphones to participate in Facebook private study group class activities for mobile learning throughout the marketing course so as to improve their learning experiences.

5.3 Course arrangement

In this study, the design of the experiment was based on the research experiment design of Deng & Travares (2013). The research study of Deng & Travares (2013) attempted to investigate the factors influencing student engagement in online discussions via the use of MOODLE and Facebook. MOODLE was conceived as an official e-learning platform (LMS) where its major function was the download of materials and assignment submission only. With its Web 1.0 design, low student engagement resulted. However, with Facebook, students were motivated by their existing Facebook usage habits, social presence and sense of ownership and Web 2.0 technology. They were keen to participate in online discussions (Deng & Travares, 2013). Therefore, six classes of marketing course students (Total: 150) studying the Higher Diploma (HD) 2-year programme in SCS, CUHK, were instructed to access LMS, i.e. MOODLE, and Facebook private groups using their smartphones with internet access for the entire semester (15 weeks). According to Deng & Travares (2013), students were required to download the course materials and submit assignments via MOODLE. We adopted the best practice of preparing online course materials in a single format, pdf, which is supported by mobile internet browsers across different platforms. The pdf documents were embedded with internet links which provided students with further online references (Kampov-Polevoi, 2010).

Figure 5.1 shows the course materials in pdf format viewed by mobile internet browser. Mobile internet browser has built-in pdf reader function so that users can zoom in, zoom out, change orientation and click the link to visit reference website.

Figure 5.1: The course materials in pdf format viewed by mobile internet browser



MOODLE is equipped with responsive web design which is a web page technology supporting screen of different sizes (Jobe, 2013; Young & Hung, 2014). Figure 5.2 & 5.3 show the response web design of MOODLE to support wide screen and small screen devices respectively.

Figure 5.2: The response web design of MOODLE supports wide screen devices

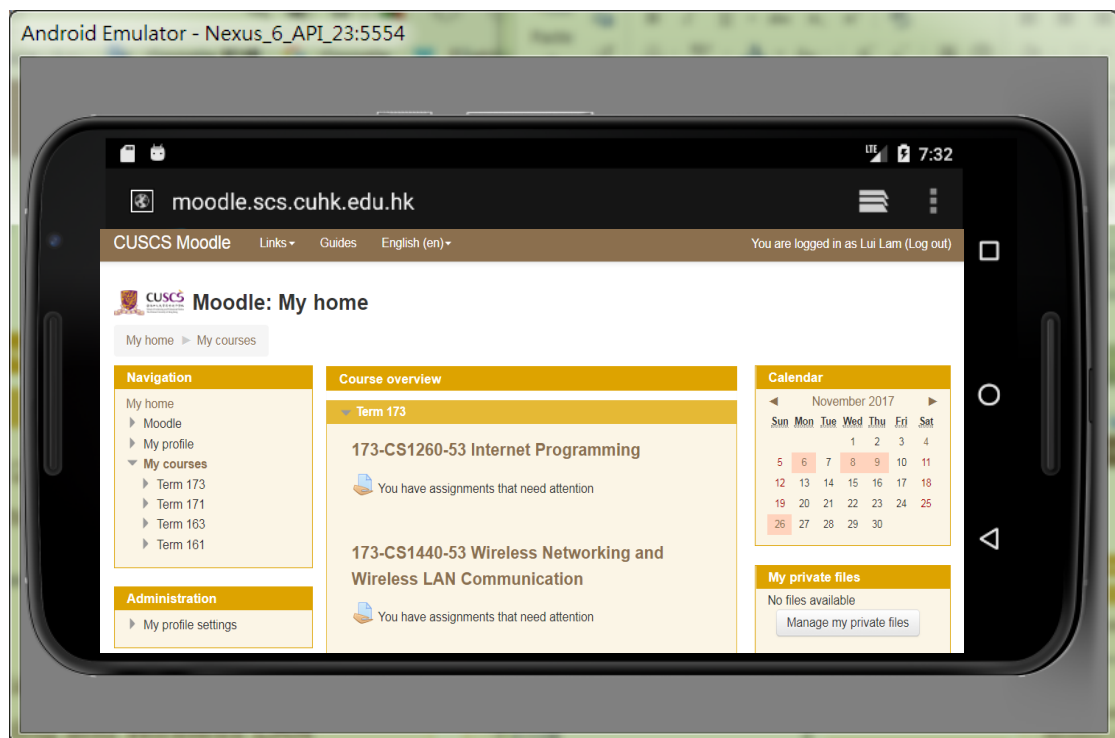
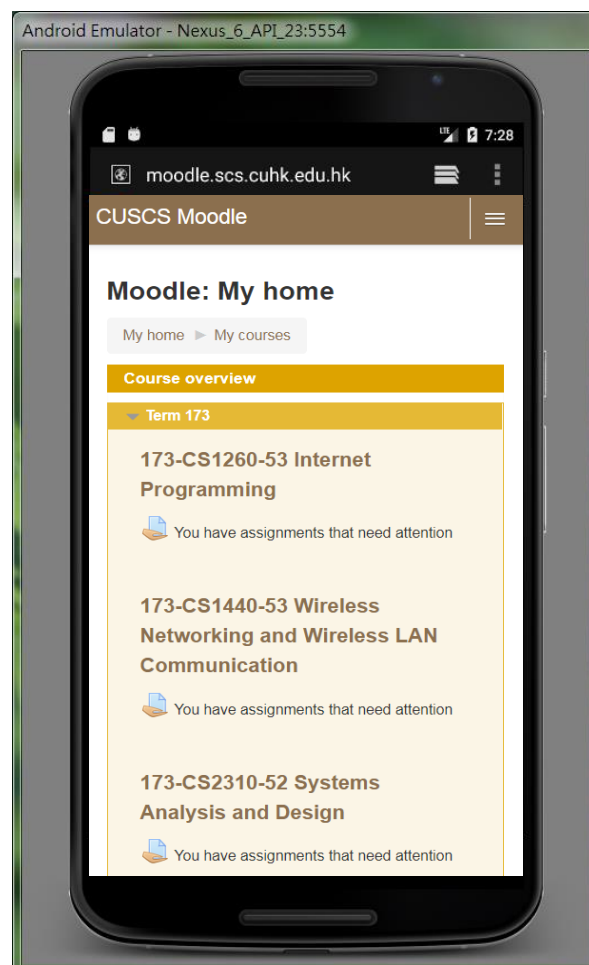


Figure 5.3: The response web design of MOODLE supports small screen devices



Mobile learning takes place over a Facebook private study group when students are participating in in-class activities. Facebook was chosen because it (1) was widely adopted by university students in Hong Kong, (2) was capable of engaging students in online discussions, (3) had good usability due to Web 2.0 technologies (Deng & Travares, 2013), (4) promoted a good classroom atmosphere, (5) improved the student-teacher relationship and (6) compensated for MOODLE (LMS) weaknesses (Wang et al., 2012). Thus, in this study, students were required to join the private study group on Facebook created by teachers at the beginning of the semester. For security, privacy and confidentiality reasons, the Facebook group was set to private so that only course students were allowed to join the study group. Figure 5.4 shows Facebook private group examples. Figure 5.5 shows the Facebook group privacy settings. Furthermore, students were required to access online course materials using their smartphone, participate in interactive and collaborative class activities through the Facebook private study group, including posting messages/photos/videos, quick quizzes (Facebook poll feature), group discussions (case study), group video presentations (case study), and group discussions (posting photos) using their smartphones for class learning activities. Since the lessons of the marketing course were arranged in a normal classroom, there was a teacher, computer, tables and chairs. Students were not provided with any school notebooks, tablets, or mobile devices. Therefore, they were allowed to use their own smartphones in class to join the Facebook study group, and to participate in the various study group class activities designed based on the learning outcomes and continuous assessments as stated in the course description form. Students were not allowed to use their smartphones for other purposes during the lesson except for the Facebook private study group class activities. With Web 2.0 technologies, the Facebook private study group could provide an online space to support student communication, interaction and collaboration. Additionally, students' solid usage experience of their smartphones and Facebook equipped them with the necessary IT knowledge and skills to participate in Facebook group in-class activities (O'Reilly, 2005; Ebner et al., 2007 July). Notwithstanding Facebook is a social networking site where information is easily publicized, the 'secret' settings of the group provides a certain degree of privacy protection. At the same time, teachers were required to answer student questions posted on Facebook promptly, and to update students with any news or supplementary resources using Facebook frequently.

Figure 5.4: Facebook private groups

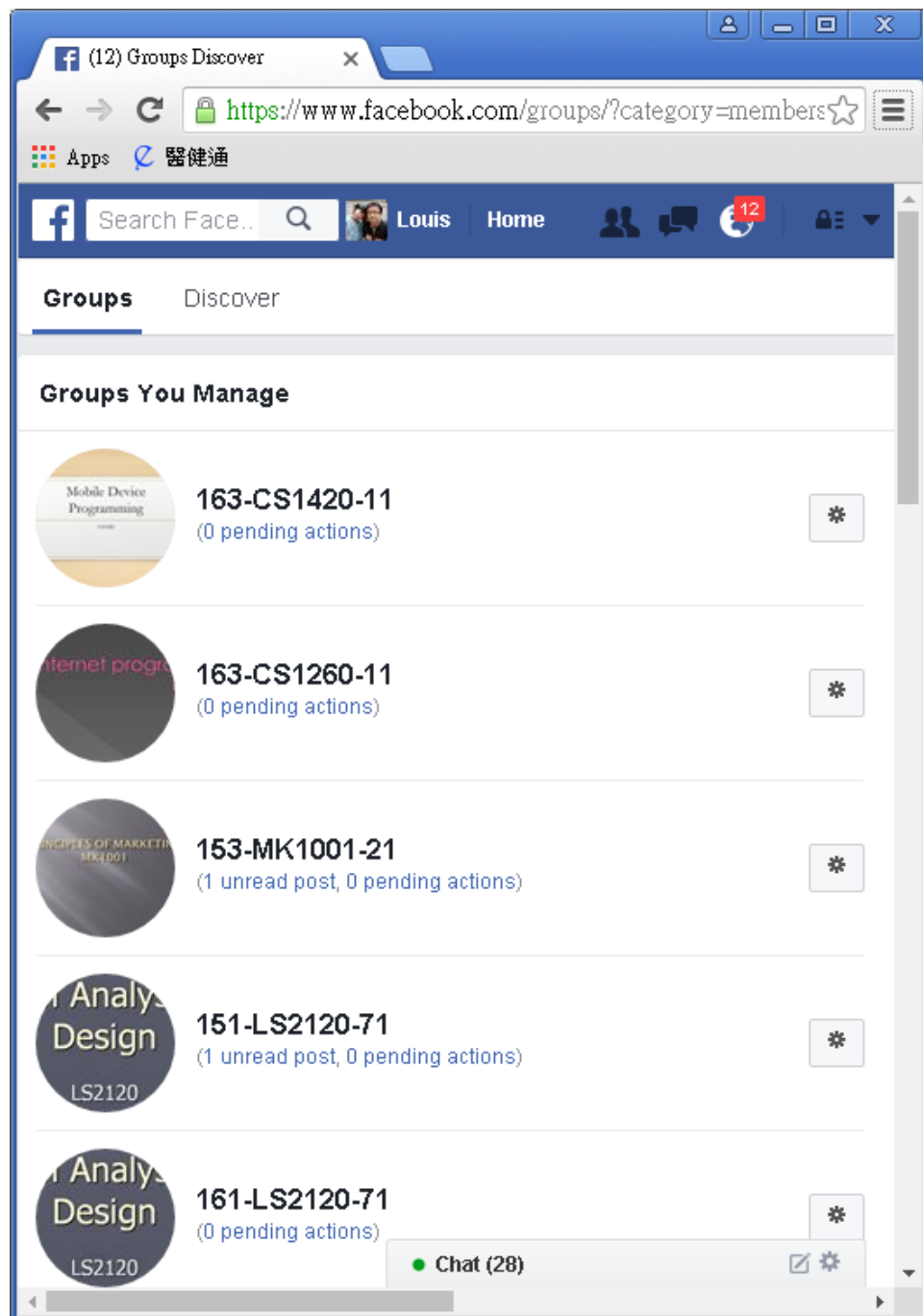


Figure 5.5: Facebook group privacy settings

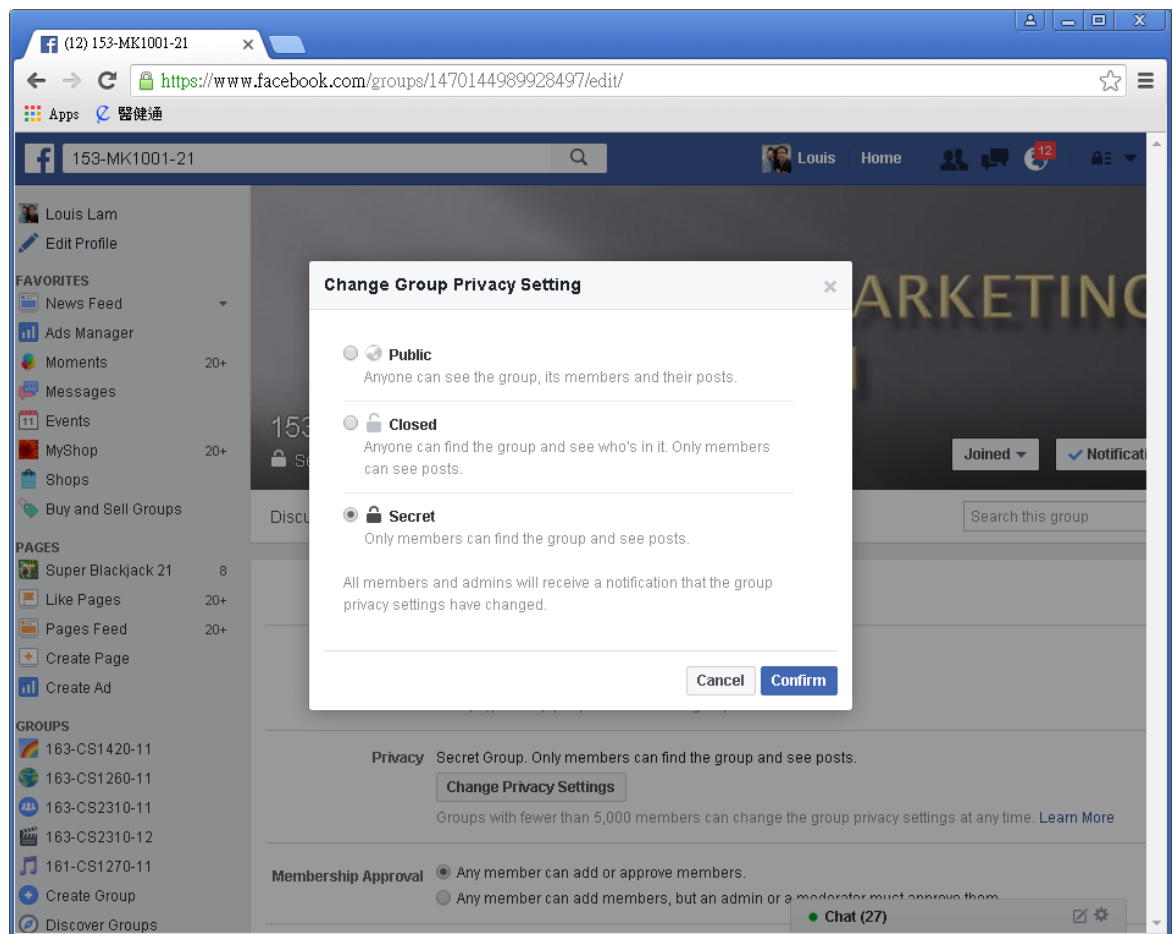


Figure 5.6 shows the details of Facebook private study group class activities to support student learning and encourage communication, interaction and collaboration. Facebook is designed with Web 2.0 technologies that support communication, interaction and collaboration (O'Reilly, 2005; Ebner et al., 2007 July). Facebook uses a responsive web design which supports users using computers or mobile devices of different screen sizes, platforms and orientation (Dabner, 2012). Therefore, Facebook adjusts its web page to fit the user's screen internet browser, such as Google chrome, Firefox, Internet Explorer, Safari, etc. Figure 5.6 shows the Facebook screen capture using a smartphone. What's more, Facebook has Facebook mobile application and Facebook messenger application to further support users in communication, interaction and collaboration.

In order to improve the student learning experience, in addition to traditional face-to-face classroom and online e-learning platform (MOODLE) instructions,

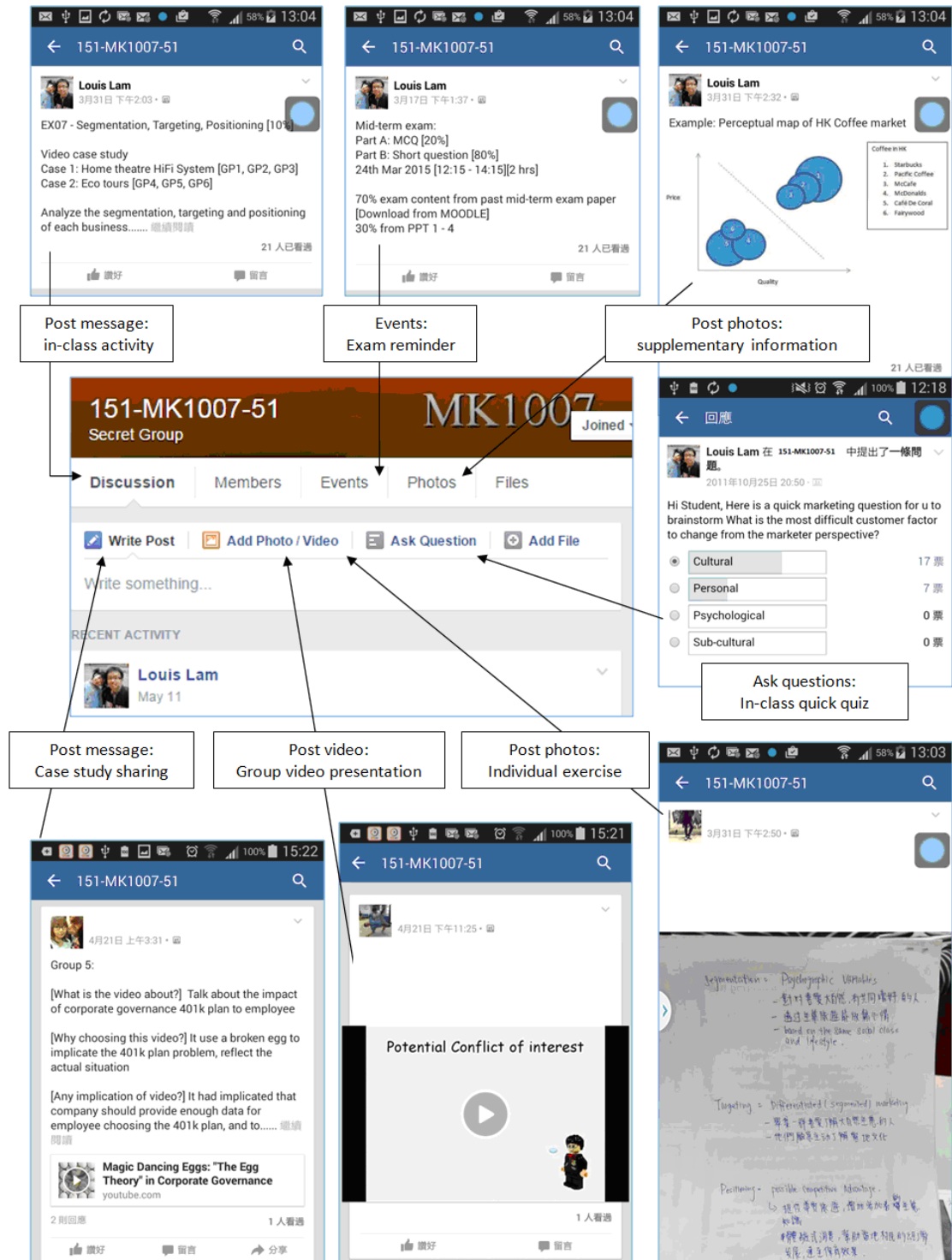
complementary in-class activities are carried out through the Facebook private study group so that students can use smartphones to participate in those activities. There are various individual-based and group-based activities which require textual or multimedia information as feedback or sharing. Moreover, the activities involve both teacher and student participation. Although these are complementary activities in the classroom environment, they enrich the classroom learning atmosphere. Table 5.1 shows the benefits of Facebook private study group in-class activities. The benefits are supported by past literature.

1. Improve individual writing (Shih, 2011; Yunus & Salehi, 2012)
2. Improve interpersonal communication & interaction (Charlton et al., 2009; Myers, 2014)
3. Improve group collaboration (Lam, 2012; Top, 2012)
4. Create sense of community (Top, 2012; Duncan & Barczyk, 2013)
5. Improve IT literacy (Gray et al., 2010; Witek & Grettano, 2012)
6. Encourage knowledge contribution and creation (Mørch, 2013; Tseng & Kuo, 2014)
7. Improve learning motivation and classroom climate (Mazer et al., 2007).

Table 5.1: The benefits of Facebook private study group in-class activities

Facebook private study group in-class activities	Benefits						
	1	2	3	4	5	6	7
Post message/photo/feedback by students and teacher	✓			✓		✓	✓
Post message/question/feedback/photo by teacher		✓			✓		✓
Quick quiz (Poll feature)			✓			✓	✓
Group discussion (case study)	✓	✓	✓	✓	✓	✓	✓
Group video presentation (case study)	✓	✓	✓	✓	✓	✓	✓
Group discussion (post photo)	✓	✓	✓	✓	✓	✓	✓

Figure 5.6: Facebook private study group learning activities



5.4 Quantitative data analysis technique

Statistical analysis is performed based on the data collected by the survey. In order to test the hypotheses whether there are significant positive associations between the factors towards intention and actual usage behavior, regression analysis is used in this study. This study adopts the quantitative data analysis widely used by researchers (Lee, 2006; Ozkan & Koseler, 2009; Wang et al., 2009; Lam, 2012; Cheung, 2014). The first step is to perform demographic and descriptive statistics analysis including the % response rate, gender and age distribution (frequency and %), and mobile usage. The second step is to perform reliability analysis on the seven constructs. This includes (1) a collinearity test is conducted by examining the P-P plot of variables to assess the assumption of normality; variance inflation factor (VIF), i.e. tolerance and VIF value, to assess the multicollinearity among independent variables in the model; and Durbin-Watson d statistic to detect serial correlation; (2) reliability is examined using Cronbach's α values for each variable; (3) Pearson correlation analysis is used to test the correlation between variables. Provided that the collinearity, reliability and correlation tests are within the acceptable ranges, the third step is to perform factor analysis by using Varimax rotation and Kaiser Normalization in order to categorize the indicators of the survey instrument into related groups. It is necessary to have factors assessed and fixed before subsequent analysis (Segars and Grover, 1993). The purpose of using factor analysis is to converge the various indicators into categories that are proposed in the hypotheses based on the factor loadings (>0.5) and to confirm there are significant positive associations between the factors and intention behavior (Cheung, 2014). Finally, multiple linear regression analysis is used to test the hypotheses using SPSS. The beta (β), t-value and corresponding levels of significance are examined. The F value is checked against the levels of significance. The adjusted R Square value is examined to see if the proposed framework and constructs can explain the students' adoption in this respect (Lam, 2012).

5.5 Measurement development

In order to ensure the constructs were correctly measured, the survey questions were adopted from the survey instruments of past literature. This made measurement more reliable and valid. Table 5.2 shows the definitions of the constructs and pertinent literature. Table 5.3 shows the constructs and the source survey instrument

Table 5.2: The definitions of the constructs and pertinent literature

Constructs	Code	Definition	Pertinent literature
Performance expectancy	PE	"The degree to which using a technology will provide benefits to consumers in performing certain activities (Venkatesh, Thong & Xu, 2012:159)"	Venkatesh, Thong & Xu (2012)
Effort expectancy	EE	"The degree of ease associated with consumers' use of the system (Venkatesh, Thong & Xu, 2012:159)".	Venkatesh, Thong & Xu (2012)
Hedonic motivation	HM	"The fun or pleasure derived from using a technology (Venkatesh, Thong & Xu, 2012:161)".	Venkatesh, Thong & Xu (2012)
Habit	HT	"The extent to which people tend to perform behaviors automatically because of learning (Venkatesh, Thong & Xu, 2012:161)".	Venkatesh, Thong & Xu (2012)
Device usability	DU	A collective concept of effectiveness, efficiency, satisfaction, security and ease of learning (Abran et al., 2003)	Abran et al., (2003)
Interactive learning	IL	Interactive learning refers to a teaching and learning approach that makes use of information and communication technology into course design and delivery (Revees & Revees, 1997; Johnson et al., 2000).	Revees & Revees (1997), Johnson et al., (2000).
Social presence	SP	"The degree of salience of the other person in the interaction and the consequent salience of interpersonal relationships (Short, Williams, & Christie, 1976)."	Short, Williams, & Christie (1976), Cheung et al. (2011)
Behavioral intention	BI	"Behavioral intention is an immediate antecedent of behavior and indication that an individual is ready to perform the behavior (Ajzen, 1991)."	Ajzen (1991), Ajzen (2002)

Table 5.3: The constructs and the source of survey instrument

Constructs	Code	Survey instrument of past literature	Number of survey questions
Performance expectancy	PE	Venkatesh, Thong & Xu (2012)	4
Effort expectancy	EE	Venkatesh, Thong & Xu (2012)	4
Hedonic motivation	HM	Venkatesh, Thong & Xu (2012)	3
Habit	HT	Venkatesh, Thong & Xu (2012)	4
Device usability	DU	Abran et al., (2003)	5
Interactive learning	IL	Johnson et al., (2000)	3
Social presence	SP	Cheung et al. (2011)	5
Behavioral intention	BI	Venkatesh, Thong & Xu (2012)	3

There were factors and demographic characteristics sections in the survey instrument. For each factor section, there were a group of indicators in order to observe the validity and significance of each factor. The indicator is represented as an item, i.e. a survey question, in the questionnaire. In order to minimize the unreliable random measurement error of a single item, multiple items were used to assess each variable because multiple items could help average out the measurement error (Nunnally and Bernstein, 1994; Gliem & Gliem, 2003). Performance expectancy was assessed with four items based on the survey instrument of Venkatesh, Thong & Xu (2012). Effort expectancy was measured using four items based on the survey instrument of Venkatesh, Thong & Xu (2012). Hedonic motivation was assessed with three items based on the survey instrument of Venkatesh, Thong & Xu (2012). Habit was measured using four items based on the survey instrument of Venkatesh, Thong & Xu (2012). Device usability was assessed with five items based on the survey instrument of Abran et al., (2003). Interactive learning was assessed with three items based on the survey instrument of Johnson et al. (2000). Social presence was measured using five items based on the survey instrument of Cheung et al. (2011). Behavioral Intention was assessed with three items based on the survey instrument of Venkatesh, Thong &

Xu (2012). The details of the items, i.e. the survey questions, are shown in Table 5.4. After the data was collected, the score of each variable was computed by the mean item score. Performance expectancy score was the mean score of four items (PE1, PE2, PE3, PE4). Effort expectancy score was the mean score of four items (EE1, EE2, EE3, EE4). Hedonic motivation was the mean score of three items (HM1, HM2, HM3). Habit was the mean score of four items (HT1, HT2, HT3, HT4). Device usability was the mean score of five items (DU1, DU2, DU3, DU4, DU5). Social presence was the mean score of five items (SP1, SP2, SP3, SP4, SP5). Interactive learning was the mean score of three items (IL1, IL2, IL3). Behavioral intention was the mean score of three items (BI1, BI2, BI3) (Ptacek, Smith & Dodge, 1994; Alexander, William & Frances, 2005). The indicators in assessing demographic and mobile usage information were adopted from Park et al., (2012) and Cheung (2014). The indicators in assessing Frequency of Facebook and MOODLE usage were adopted from Limayem & Hirt (2003) and Venkatesh, Thong & Xu (2012). Table 5.5 shows the source of the survey instrument for demographic and mobile usage information.

Table 5.4: The indicators and survey questions

Indicator	Survey question
PE1 PE2 PE3 PE4	I find “mobile Facebook private study group” useful in my study. Using “mobile Facebook private study group” is important to me in study. Using “mobile Facebook study group” helps me accomplish my study more quickly. Using “mobile Facebook study group” increases my productivity in study.
EE1 EE2 EE3 EE4	Learning how to use “mobile Facebook private study group” is easy for me. My interaction with “mobile Facebook private study group” is clear and understandable. I find “mobile Facebook private study group” is easy to use. It is easy for me to become skillful at using “mobile Facebook private study group”
IL1 IL2 IL3	The interaction of class activities using smartphone with Internet access over “Facebook private study group” can stimulate learning. The class activities using smartphone with Internet access over “Facebook private study group” can increase my learning motivation. The class activities using smartphone with Internet access over “Facebook private study group” allow me to work with classmates in finding the answers to the discussion questions or case studies.
DU1	The screen size of my smartphone is suitable for accessing “mobile Facebook private study group”.

Indicator	Survey question
DU2	The touch screen of my smartphone is suitable for accessing “mobile Facebook private study group”.
DU3	The audio and video output of my smartphone is suitable for accessing “mobile Facebook private study group”.
DU4	The speed of Internet access of my smartphone is suitable for accessing “mobile Facebook private study group”.
DU5	The processing power my smartphone is suitable for accessing “mobile Facebook private study group”.
HM1	Using “mobile Facebook private study group” is fun.
HM2	Using “mobile Facebook private study group” is enjoyable.
HM3	Using “mobile Facebook private study group” is very entertaining.
SP1	There is a sense of human contact in “mobile Facebook private study group”
SP2	There is a sense of personalness in “mobile Facebook private study group”
SP3	There is a sense of sociability in “mobile Facebook private study group”
SP4	There is a sense of human warmth in “mobile Facebook private study group”
SP5	There is a sense of human sensitivity in “mobile Facebook private study group”
HT1	The use of “mobile Facebook private study group” has become a habit for me.
HT2	I am addicted to using “mobile Facebook private study group”.
HT3	I must use “mobile Facebook private study group”.
HT4	Using “mobile Facebook private study group” has become natural to me.
BI1	I intend to continue using “mobile Facebook private study group” in the future.
BI2	I will always try to use “mobile Facebook private study group” in my daily life.
BI3	I plan to continue to use “mobile Facebook private study group” frequently.

Table 5.5: The source of the survey instrument for demographic and mobile usage information

Demographic and mobile usage information	Survey instrument of past literature
1. School year 2. Gender 3. Most commonly used smartphone 4. Main method of mobile learning 5. Major place of mobile learning	Park et al., (2012) Cheung (2014)
6. Frequency of Facebook and MOODLE usage	Limayem & Hirt (2003) Venkatesh, Thong & Xu (2012)

The indicators for assessing the constructs, i.e. performance expectancy, effort expectancy, hedonic motivation, habit, device usability and behavioral intention, were

adopted from Venkatesh et al., (2012). The indicators for assessing social presence were adopted from Gefen and Straub (2004) and Cheung et al. (2011). The indicators for assessing Interactive Learning were adopted from Johnson et al., (2000). The indicators for assessing Device Usability were adopted from Abran et al., (2003). Table 5.3 shows the survey questionnaire and the source of survey instruments. The questionnaire contained 7-point Likert scale questions from [1] strongly disagree to [7] strongly agree. This is because the 7-point Likert-type scale has been used extensively by scholars in educational research (Web, Gill & Poe, 2005; Acquisti & Gross, 2006, June; Hardré, Sullivan, & Crowson, 2009; Emerson & MacKay, 2011; Chiou & Liang, 2012; Register-Mihalik et al., 2013; Lam & Ng, 2015, July). Besides, the 7-point Likert-type scale could provide more granularities and be more precise compared to a 5-point Likert-type scale (Pearse, 2011; Joshi et al., 2015). The survey questionnaire was passed to LSBU and local supervisors for comments.

5.6 Pilot study

Before the main online survey was conducted, a pilot study was conducted by inviting 20 marketing course students. The purpose of the pilot study was to establish whether there were problems in terms of (1) understanding the survey questions in addition to basic grammatical mistakes; (2) the flow and structure of the survey questionnaire; (3) instructions and information related to the survey. A pilot study is a kind of feasibility study to pre-test the research instrument so as to prepare for the main study. A pilot study is a kind of risk management in research because it can signal warnings whether the instruments are not appropriate for the research (Van & Hundley, 2002). Before the pilot study was conducted, the questionnaire was examined and proof-read by university lecturers, who specialize in business and management, and LSBU DBA supervisors (Lancaster, Dodd & Williamson, 2004). The 20 marketing course students, who were invited to participate in the pilot study, were informed about the purpose of the pilot study. They were given 7 days before they decided to participate in the pilot study voluntarily in order to give feedback on the survey questionnaire for improvement. The feedback from students and comments from lecturers and supervisors were consolidated in order to amend and fine-tune the survey questionnaire. After receiving their feedback and comments, some minor items in the questions were modified based on the feedback from supervisors and pilot study

respondents who were excluded from the subsequent official survey (Van Teijlingen & Hundley, 2002). LSBU University Research Ethics Committee (UREC) was informed about any changes in the questionnaire, and subsequently the official survey was conducted after obtaining UREC official approval of the changes (Appendix 10).

5.7 Quantitative data analysis

5.7.1 Descriptive statistics

A total of 150 students were invited by email to participate in the online survey, of which 123 students voluntarily participated in the online survey. The response rate was 82%.

Table 5.6: The demographic profile (N=123)

Measure and items	Frequency	Percentage (%)
Gender		
Male	85	69.1
Female	38	30.9
Age		
18 - 21	93	75.6
22 - 24	21	17.0
25 - 29	9	7.3
30 - 33	0	0
34 - 40	0	0

As shown in table 5.6, among the 123 respondents, 85 (69.1%) of them were male whereas 38 (30.9%) were female. There were 93 (75.6%) respondents with ages ranging from 18 - 21 whereas the other 30 (24.3%) respondents were mature students with ages ranging from 22 - 29.

Table 5.7: Mobile usage information (N=123)

Measure and items	Frequency M + F (% of N)	Frequency Male (% of N)	Frequency Female (% of N)
Most commonly used mobile devices (multiple answers)			
• Netbook	5 (4.1%)	4 (3.3%)	1 (0.8%)

Measure and items	Frequency M + F (% of N)	Frequency Male (% of N)	Frequency Female (% of N)
<ul style="list-style-type: none"> • Portable multimedia player • iPod • PDA • Smartphone • Electronic dictionary • iPad • Android Tablet 	1 (0.8%) - - 117 (95.1%) - 35 (28.5%) 20 (16.3%)	1 (0.8%) - - 79 (64.2%) - 23 (18.7%) 15 (12.2%)	- - - 38 (30.9%) - 12 (9.8%) 5 (4.1%)
Method of Internet access (multiple answers)			
<ul style="list-style-type: none"> • 3G • 4G LTE • Home WIFI • Public WIFI 	51 (41.5%) 72 (58.5%) 101 (82.1%) 88 (71.5%)	38 (30.9%) 47 (38.2%) 75 (61.0%) 58 (47.2%)	13 (10.6%) 25 (20.3%) 26 (21.1%) 30 (24.4%)
Main method of mobile learning (multiple answers)			
<ul style="list-style-type: none"> • Learn by download course contents • Learn by interaction through Facebook private study group • Learn by video case study • External contents searched from Internet • Internal contents in smartphone 	85 (69.1%) 69 (56.1%) 47 (38.2%) 37 (30.1%) 26 (21.1%)	58 (47.2%) 45 (36.6%) 28 (22.8%) 16 (13.0%) 18 (14.6%)	27 (22.0%) 24 (19.5%) 19 (15.4%) 21 (17.1%) 8 (6.5%)
Common use of mobile learning contents (multiple answers)			
<ul style="list-style-type: none"> • Major courses in university • Language study • Lectures for exam getting certifications • Lectures for getting a job • Complete assignments or projects • Prepare for presentation • Prepare for test and examination • Class activities 	76 (61.8%) 70 (56.9%) 26 (21.1%) 23 (18.7%) 57 (46.3%) 39 (31.7%) 61 (49.6%) 49 (39.8%)	49 (39.8%) 42 (34.1%) 15 (12.2%) 14 (11.4%) 34 (27.6%) 19 (15.4%) 38 (30.9%) 27 (22.0%)	27 (22.0%) 28 (22.8%) 11 (8.9%) 9 (7.3%) 23 (18.7%) 20 (16.3%) 23 (18.7%) 22 (17.9%)
Main place of mobile learning (multiple answers)			
<ul style="list-style-type: none"> • At home 	117 (95.1%)	83 (67.5%)	34 (27.6%)

Measure and items	Frequency M + F (% of N)	Frequency Male (% of N)	Frequency Female (% of N)
<ul style="list-style-type: none"> In the university Traveling situation On the streets 	118 (95.9%) 86 (69.9%) 77 (62.6%)	84 (68.3%) 58 (47.2%) 50 (40.7%)	34 (27.6%) 28 (22.8%) 27 (22.0%)
Frequency of usage of 'Mobile Facebook private study group (FBPSG)'	Mean M + F	Mean M	Mean F
<ul style="list-style-type: none"> How often do you access "mobile FBPSG during a week?" How often do you post "mobile FBPSG during a week?" 	5.3 3.4	5.1 3.6	5.6 2.8

As shown in table 5.7, in terms of 'most commonly used mobile devices', smartphones, iPads and Android tablets were three most common devices having 95.1% (M=64.2% & F=30.9%), 28.5% (M=18.7% & F=9.8%) and 16.3% (M=12.2% & F=4.1%) respectively. The statistics showed students preferred mobile devices, but it did not mean they used mobile devices other than smartphones in this study. Furthermore, home and public WIFI were two common internet access methods for respondents having 82.1% (M=61.0% & F=21.1%) and 71.5% (M=47.2% & F=24.4%) respectively whereas 4G LTE and 3G had 58.5% (M=38.2% & F=20.3%) and 41.5% (M=30.9% & F=10.6%) respectively. Regarding the method of mobile learning, 'learn by download course contents' had 69.1% (M=47.2% & F=22.0%) whereas 'learn by interaction through Facebook private study group' had 56.1% (M=36.6% & F=19.5%). Mobile learning using video case study, external and internal searching are 38.2% (M=22.8% & F=15.4%), 30.1% (M=13.0% & F=17.1%) and 21.1% (M=14.6% & F=6.5%) respectively. Furthermore, the mobile learning content was commonly used for 'major courses in university' (M+F=61.8%; M=39.8%; F=22.0%), 'language study' (M+F=56.9%; M=34.1%; F=22.8%), 'prepare for test and examination' (M+F=49.6%; M=30.9%; F=18.7%), 'complete assignments or projects' (M+F=46.3%; M=27.6%; F=18.7%) and 'class activities' (M+F=39.8%; M=22.0%; F=17.9%). On the other hand, university (M+F=95.9%; M=68.3%; F=27.6%) and home (M+F=95.1%; M=67.5%; F=27.6%) were two common places for mobile learning. In terms of the frequency of 'Mobile Facebook private study

group (FBPSG)' usage, there was average access of 5.3 times per week and 3.4 message posts per week.

5.7.2 Analysis of gender and age group differences

Some scholars have evidenced that gender and age differences exist in the context of technology adoption (Wang, Wu, Wang, 2009; Venkatesh et al., 2012). Therefore, non-parametric tests, i.e. the Mann–Whitney U-test and the Kruskal Wallis Test were used to test respectively whether there were gender or age differences in the population. Non-parametric tests were used because the data sample size was relatively small and researchers often disagree as to whether Likert scale data can be considered as normally distributed. Non-parametric tests are more robust in these circumstances as they make no assumption as to the distribution of the parent population and can be applied to smaller samples of data. (Norman, 2010; Alexander, William & Frances, 2005). The Mann–Whitney U-test was chosen for investigating gender because there were two gender groups whereas the Kruskal Wallis Test was chosen for investigating age group difference because there were the three age groups (Alexander, William & Frances, 2005). Though the sample sizes were different in terms of age group or gender, the Mann–Whitney U-test and the Kruskal Wallis Test could be used to test the difference in gender (Mann & Whitney, 1947; Breslow, 1970).

5.7.2.1 Gender difference

The hypotheses of gender difference in the scores of seven independent variables were as follows.

Hypothesis 1

- H_0 : There is no significant gender difference in the scores for performance expectancy.
- H_A : There is a significant gender difference in the scores for performance expectancy.

Hypothesis 2

- H_0 : There is no significant gender difference in the scores for effort expectancy.
- H_A : There is a significant gender difference in the scores for effort expectancy.

Hypothesis 3

- H_0 : There is no significant gender difference in the scores for hedonic motivation.
- H_A : There is a significant gender difference in the scores for hedonic motivation.

Hypothesis 4

- H_0 : There is no significant gender difference in the scores for habit.
- H_A : There is a significant gender difference in the scores for habit.

Hypothesis 5

- H_0 : There is no significant gender difference in the scores for device usability.
- H_A : There is a significant gender difference in the scores for device usability.

Hypothesis 6

- H_0 : There is no significant gender difference in the scores for social presence.
- H_A : There is a significant gender difference in the scores for social presence.

Hypothesis 7

- H_0 : There is no significant gender difference in the scores for interactive learning.
- H_A : There is a significant gender difference in the scores for interactive learning.

As shown in Table 5.8, the z-statistic of (1) performance expectancy is 0.249, (2) device usability is 0.102, (3) effort expectancy is 0.005, (4) hedonic motivation is 0.580, (5) social presence is 0.133, (6) habit is 0.604, and (7) interactive learning is 0.360.

Table 5.8: Mann–Whitney U-test Statistics^a

	PE	DU	EE	HM	SP	HT	IL
Mann-Whitney U	1406.000	1318.000	1104.000	1514.500	1341.500	1520.500	1450.500
Wilcoxon W	2147.000	4973.000	1845.000	5169.500	4996.500	5175.500	5105.500
Z	-1.153	-1.637	-2.806	-.554	-1.502	-.519	-.916
Asymp. Sig. (2-tailed)	.249	.102	.005	.580	.133	.604	.360

a. Grouping Variable: Gender

Therefore, the alternate hypotheses of performance expectancy, device usability, hedonic motivation, social presence, habit, and interactive learning are rejected at 5 per cent level of significance ($p < 0.05$). The null hypothesis of effort expectancy is rejected at 5 per cent level of significance ($p < 0.05$). Therefore, there is no evidence to reject the null hypothesis for performance expectancy, device usability, hedonic motivation, social presence, or interactive learning at 5 per cent level of significance ($p < 0.05$).

As shown in Figure 5.7, a Boxplot was created to examine the gender difference in the score of effort expectancy. The male box has about the same length as the whiskers whereas the female box is shorter than the length of the whiskers. Besides, the male box median (~5.0) exceeds the female box median (~4.6). The female appears to have a larger variability than the male. Male and female are reasonably symmetric. There is an outlier in Female.

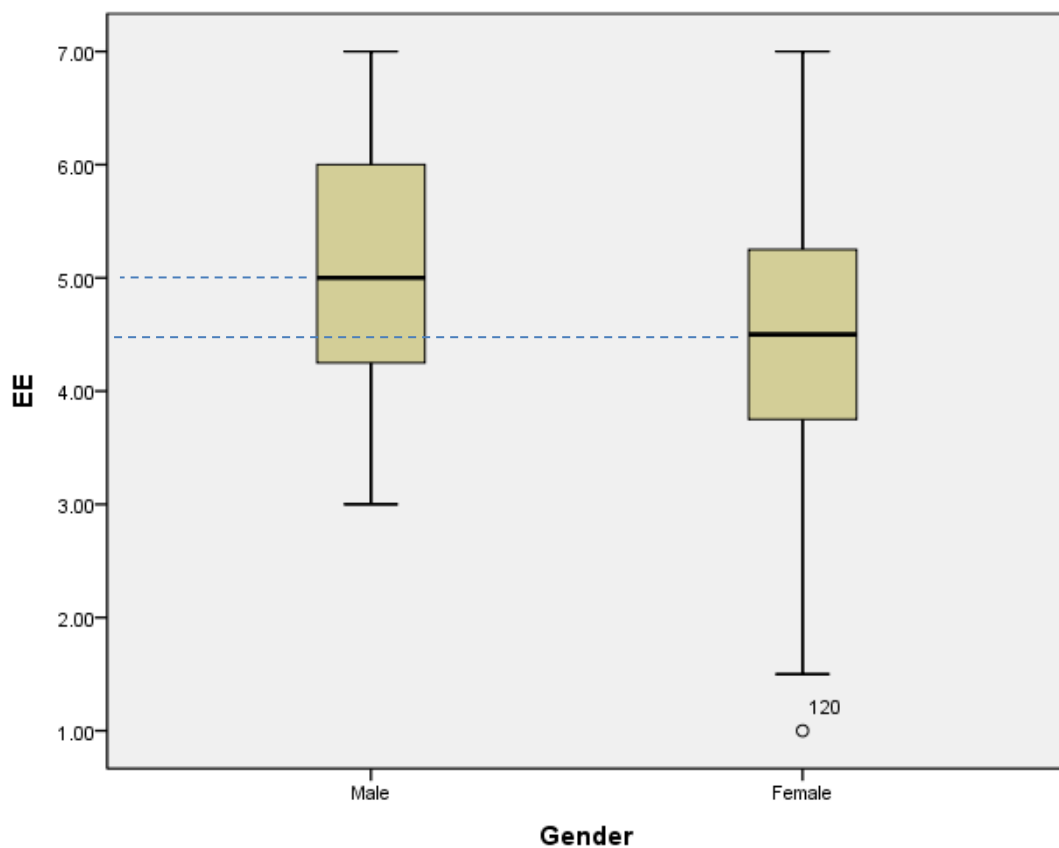


Figure 5.7: Boxplot for gender difference

5.7.2.2 *Age group difference*

In this study, we have three age groups (1) 18-21, (2) 22-24, and (3) 25-29. The hypotheses of age group difference in the scores of seven independent variables were as follows.

Hypothesis 1

- H_0 : There is no significant age group difference in the scores for performance expectancy.
- H_A : There is a significant age group difference in the scores for performance expectancy.

Hypothesis 2

- H_0 : There is no significant age group difference in the scores for effort expectancy.
- H_A : There is a significant age group difference in the scores for effort expectancy.

Hypothesis 3

- H_0 : There is no significant age group difference in the scores for hedonic motivation.
- H_A : There is a significant age group difference in the scores for hedonic motivation.

Hypothesis 4

- H_0 : There is no significant age group difference in the scores for habit.
- H_A : There is a significant age group difference in the scores for habit.

Hypothesis 5

- H_0 : There is no significant age group difference in the scores for device usability.
- H_A : There is a significant age group difference in the scores for device usability.

Hypothesis 6

- H_0 : There is no significant age group difference in the scores for social presence.
- H_A : There is a significant age group difference in the scores for social presence.

Hypothesis 7

- H_0 : There is no significant age group difference in the scores for interactive learning.
- H_A : There is a significant age group difference in the scores for interactive learning.

As shown in Table 5.9, there are significant age group differences in the scores of performance expectancy, device usability, hedonic motivation, social presence, and interactive learning ($p < 0.05$).

Table 5.9: Kruskal Wallis Test Statistics^{a,b}

	PE	DU	EE	HM	SP	HT	IL
Chi-Square	11.651	9.992	.441	7.023	8.301	.746	9.550
df	2	2	2	2	2	2	2
Asymp. Sig.	.003	.007	.802	.030	.016	.689	.008

a. Kruskal Wallis Test

b. Grouping Variable: AgeGP

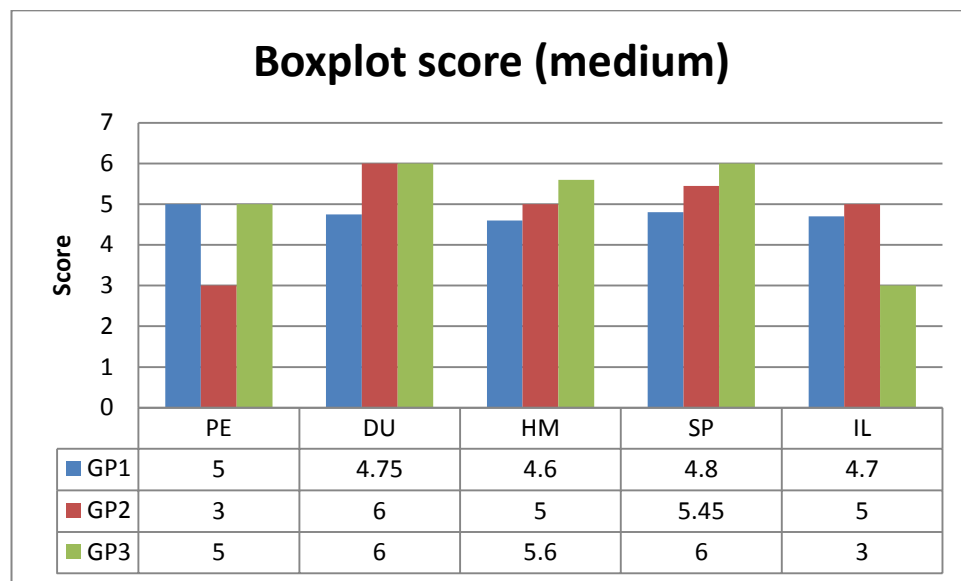
Therefore, the alternate hypotheses of effort expectancy and habit are rejected at 5 per cent level of significance. Besides, the null hypothesis of performance expectancy, device usability, hedonic motivation, social presence and interactive learning are rejected at 5 per cent level of significance ($p < 0.05$). In summary, there are significant age group differences in the scores of performance expectancy, device usability, hedonic motivation, social presence, and interactive learning except for effort expectancy or habit, at 5 per cent level of significance ($p < 0.05$).

In order to further understand the difference visually, as shown in Figure 5.2, Boxplots were created to examine the age difference in the score of performance expectancy, device usability, hedonic motivation, social presence and interactive learning. Table 5.8 shows the interpretation of Boxplots of different variables.

Table 5.10: The interpretation of Boxplots for different variables

GP1: Group aged 18-21, GP2: Group aged 22-24, GP3: Group aged 25-29

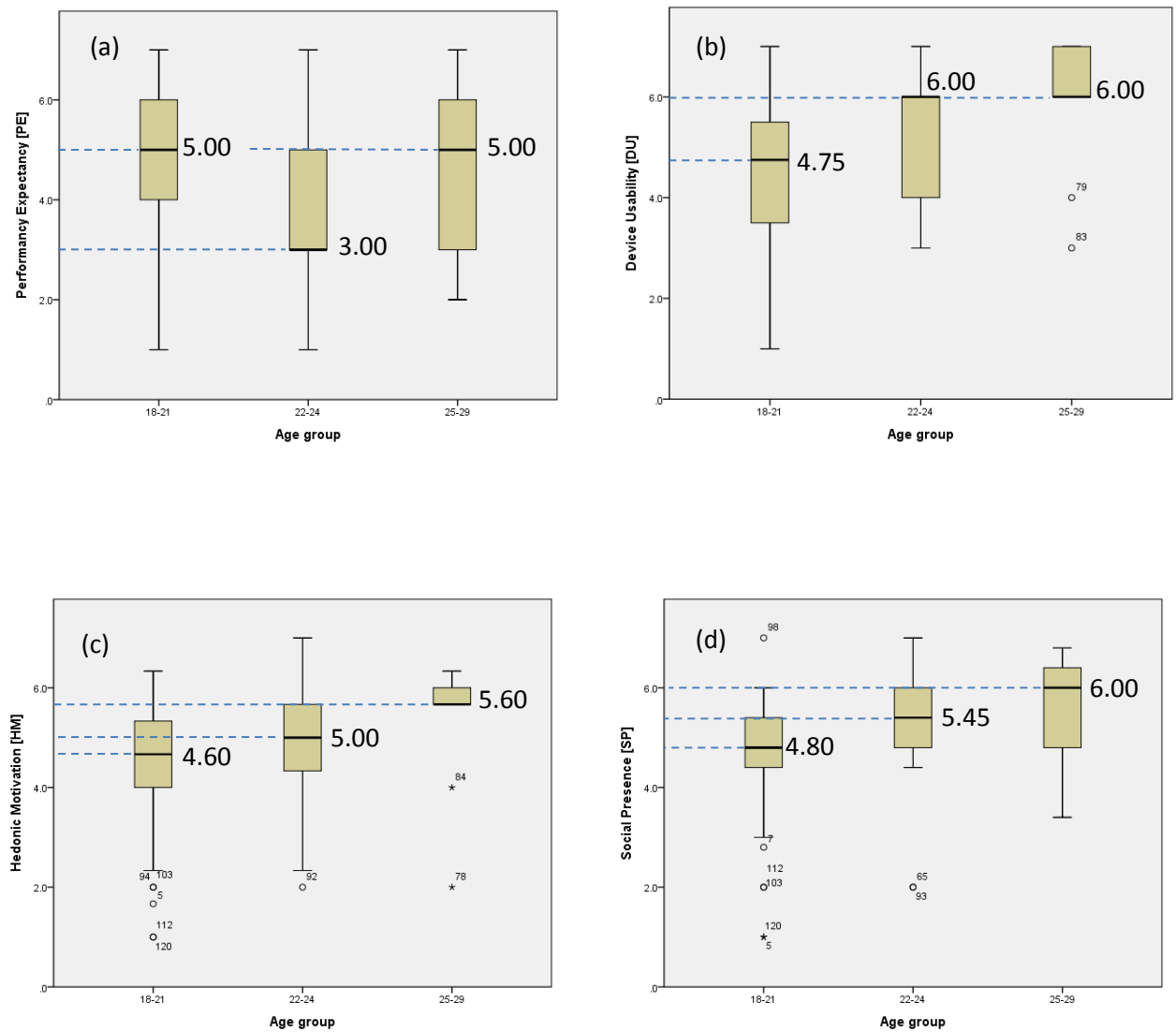
Variable	GP1	GP2	GP3	Fig 5.8
PE	5.00	3.00	5.00	(a)
DU	4.75	6.00	6.00	(b)
HM	4.60	5.00	5.60	(c)
SP	4.80	5.45	6.00	(d)
IL	4.70	5.00	3.00	(e)

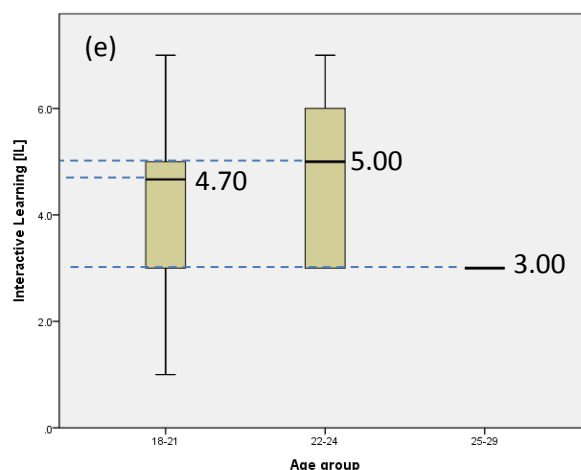


For the variables DU, HM, and SP, there is a clear trend that GP2 and GP3 have higher average scores. In other words, the older the respondent, the higher the average score. One of the reasons is that different age groups may think in different ways during the adoption of technology (Venkatesh & Morris, 2000). It is also believed that younger users have higher levels of self-worth that make them less affected by others in the adoption of mobile learning (Wang, Wu & Wang, 2009). In terms of mobile learning pedagogical strategy, previous researchers recommend that the knowledge level of learners and challenges of mobile learning should be matched so that learners can benefit from it (Wang, Wu & Wang, 2009). Therefore, mobile learning using Facebook should be designed by (1) strengthening the smartphone's usability, (2) improving the enjoyment, and (3) emphasizing the sense of online community. For variable PE, GP1 and GP3 have higher average scores. For variable IL, GP1 and GP2 have higher average scores. Though there are no obvious trends for these variables,

previous researchers believe that it is due to the challenge of mobile learning being lower than the skills of users, and hence they feel bored and have negative feedback (Kiili, 2005). Therefore, it is necessary to address the problems of mobile learning and improve performance expectancy and interactive learning.

Figure 5.8: The Boxplots for age difference in the score of PE, DU, HM, SP and IL





5.7.2.3 Summary of Non-parametric tests

The results of non-parametric tests showed that there were significant (1) gender differences in the score for effort expectancy and (2) age differences in the score for performance expectancy, device usability, hedonic motivation, social presence [SP], and interactive learning. The findings corroborate past literature about the existence of age and gender differences in technology acceptance (Wang, Wu, Wang, 2009; Venkatesh et al., 2012). Therefore, the age and gender differences will be further investigated and explored in qualitative research in section 6.

5.7.3 Factor analysis

In order to ensure similar patterns of survey responses were grouped into multiple observed variables, factor analysis was used for data reduction. Factor analysis, can help find the underlying latent (unobservable) variables which were revealed in the manifest (observed) variables (Idre, 2017). As shown in table 5.11, the Kaiser-Meyer-Olkin (KMO) sampling adequacy should be greater than .6 (Hair et al., 2006) and the Bartlett's test of Sphericity is significant (e.g. $p < .05$). Furthermore, as shown in table 5.12, the communality (h^2) should be greater than .5 (Osborne & Costello, 2009). The communalities in the Extraction column of Table 5.11 reflect the common variance in the data structure. For instance, 82.3% of the variance associated with PE1 is common, or shared, variance. ($h^2 = .823$).

Table 5.11: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.748
Bartlett's Test of Sphericity	Approx. Chi-Square	2532.355
	df	465
	Sig.	.000

Table 5.12: Communalities

	Initial	Extraction
PE1	1.000	.823
PE2	1.000	.857
PE3	1.000	.847
PE4	1.000	.835
DU1	1.000	.632
DU2	1.000	.834
DU3	1.000	.846
DU4	1.000	.837
EE1	1.000	.662
EE2	1.000	.711
EE3	1.000	.688
EE4	1.000	.686
HM1	1.000	.728
HM2	1.000	.535
HM3	1.000	.585
SP1	1.000	.717
SP2	1.000	.773
SP3	1.000	.552
SP4	1.000	.679
SP5	1.000	.579
HT1	1.000	.720
HT2	1.000	.668
HT3	1.000	.707
HT4	1.000	.650
HT5	1.000	.668
IL1	1.000	.967
IL2	1.000	.883
IL3	1.000	.880
BI1	1.000	.698
BI2	1.000	.542
BI3	1.000	.479
Extraction Method: Principal Component Analysis.		

Table 5.13: Total variables explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cum %	Total	% of Variance	Cum %	Total	% of Variance	Cum %
1	7.554	24.368	24.368	7.554	24.368	24.368	3.768	12.155	12.155
2	3.771	12.164	36.532	3.771	12.164	36.532	3.608	11.640	23.795
3	2.707	8.734	45.265	2.707	8.734	45.265	3.403	10.977	34.772
4	2.551	8.230	53.495	2.551	8.230	53.495	2.842	9.168	43.940
5	1.877	6.055	59.550	1.877	6.055	59.550	2.652	8.555	52.495
6	1.603	5.172	64.722	1.603	5.172	64.722	2.408	7.769	60.264
7	1.138	3.669	68.391	1.138	3.669	68.391	1.859	5.996	66.260
8	1.065	3.437	71.828	1.065	3.437	71.828	1.726	5.567	71.828
9	.864	2.788	74.616						
10	.848	2.734	77.350						
11	.763	2.463	79.813						
12	.680	2.194	82.007						
13	.647	2.086	84.093						
14	.623	2.009	86.102						
15	.542	1.747	87.849						
16	.508	1.640	89.489						
17	.406	1.310	90.799						
18	.383	1.235	92.034						
19	.358	1.155	93.189						
20	.309	.997	94.186						
21	.291	.939	95.125						
22	.254	.818	95.943						
23	.251	.809	96.753						
24	.208	.671	97.424						
25	.195	.629	98.052						
26	.178	.574	98.627						
27	.170	.549	99.176						
28	.118	.381	99.558						
29	.064	.206	99.764						
30	.039	.127	99.891						
31	.034	.109	100.000						

Extraction Method: Principal Component Analysis.

As shown in table 5.13, there were eight major components identified after factor analysis. The table shows that the amount of variance in the total collection of variables/items was explained by the component(s). Component 1 explains 12.155% of the variance in the items. Component 2 explains 11.640% of the variance in the

items. Component 3 explains 10.977% of the variance in the items. Component 4 explains 9.168% of the variance in the items. Component 5 explains 8.555% of the variance in the items. Component 6 explains 7.769% of the variance in the items. Component 7 explains 5.996% of the variance in the items. Component 8 explains 5.567% of the variance in the items. In summary, 71.828% of the variance in these items was explained by the eight extracted components.

In order to find out the optimal combination of variables, rotations of axes were required to make the data fit better and be easier to interpret. In other words, rotations could improve the interpretation of the factors (Maike, 2017). There are two common types of rotation to facilitate factor interpretation, i.e. orthogonal and oblique. Orthogonal rotation produced factors that were uncorrelated, i.e. the axes crossed at right angles, whereas oblique rotation allowed factor correlation, i.e. the axes crossed at an angle other than a right angle. VARIMAX (Kaiser, 1958), QUARTIMAX (Carroll, 1953) and EQUAMAX are common orthogonal rotation methods. In this research, VARIMAX was used because it could help in looking for a linear combination (orthogonal rotation) of the uncorrelated factors by maximizing the factor loadings (Pennsylvania, 2004; Osbome, 2015). As shown in Table 5.14, the Rotated Component Matrix showed that there were eight components identified after factor analysis using the VARIMAX method of orthogonal rotation. The responses were grouped into variables which were consistent with the survey instruments of past literature. The SPSS outputs of Factor Analysis are shown in Appendix 11.

Table 5.14: Rotated Component Matrix^a

	Component							
	1	2	3	4	5	6	7	8
PE2	.918							
PE4	.894							
PE1	.890							
PE3	.860							
HT1		.811						
HT2		.767						
HT3		.748						
HT4		.719						
HT5		.661						
DU4			.890					
DU3			.885					
DU2			.885					
DU1			.763					
IL1				.980				
IL2				.936				
IL3				.931				
SP1					.769			
SP2					.767			
SP3					.701			
SP4					.609			
SP5					.510			
EE2						.770		
EE1						.744		
EE3						.698		
EE4						.576		
HM1							.803	
HM2							.658	
HM3							.562	
BI1								.741
BI2								.614
BI3								.555

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

5.7.4 Multiple Linear Regression Analysis

Multiple linear regression analysis was used to test the significance of variables. Furthermore, in order to avoid any violation of the basic assumptions underlying the least squares method used by the linear regression model, P-P plot was conducted to

assess the assumption of normality. The plot showed that the quantile pairs fell nearly on a straight line. Thus, it was reasonable to conclude that the data used in this research was approximately normal. Then, this research used the VIF to assess the multicollinearity among independent variables in the model. As shown from the table 5.15, the tolerance and VIF values of all independent variables (1) to (7) were within the range (Tolerance > .2 and VIF <4) that had no severe multicollinearity problems among the regressors. Finally, Durbin-Watson d statistic was used to detect serial correlation. The value of 1.990 (less than 2) indicated that an autocorrelation problem did not exist (Gujarati & Porter 2003).

Table 5.15: Tolerance, VIF and Durbin Watson

Independent variables^a	Tolerance	VIF
Performance Expectancy (PE)	.871	1.148
Habit (HT)	.504	1.983
Device Usability (DU)	.827	1.209
Effort Expectancy (EE)	.682	1.467
Social Presence (SP)	.641	1.561
Interactive Learning (IL)	.721	1.387
Hedonic Motivation (HM)	.558	1.792
Durbin-Watson	1.988	

^aDependent variable: Behavioral intention to use a Facebook private study group for mobile learning

5.7.5 Reliability and validity analysis

Reliability was examined using Cronbach's α values for each variable. As shown in the table 5.16, the values of eight variables were above .72, an acceptable threshold suggested by Nunnally and Bernstein (1994). The reliability of Performance Expectancy (PE) =.839; Habit (HT) =.777; Device Usability (DU) =.811; Effort Expectancy (EE) =.799; Social Presence (SP) =.793; Interactive Learning (IL) =.796; Hedonic Motivation (HM) =.775 and Behavioral Intention (BI) =.748.

Table 5.16: Descriptive statistics, correlation^a, reliabilities^b among study variables (n = 123)

Variables	Means	SD	1	2	3	4	5	6	7	8
1. PE	5.049	1.549	(.839)							
2. HT	4.735	1.800	-.016	(.777)						
3. DU	4.512	1.793	.251	.286	(.811)					
4. EE	4.927	1.889	-.030	.496	.175	(.799)				
5. SP	5.231	1.772	.012	.545	.251	.322	(.793)			
6. IL	4.407	1.937	.116	.411	.238	.429	.278	(.796)		
7. HM	4.711	1.724	.203	.559	.312	.384	.501	.407	(.775)	
8. BI	4.645	1.718	.256*	.645*	.467*	.539*	.580*	.561*	.664*	(.748)

a. Reliabilities (Cronbach's α) are in parentheses.

b. Dependent variable: Behavioral Intention (BI)

* Correlation is significant at the 0.01 level.

5.7.6 Pearson correlation analysis

In terms of the correlations between variables, Hedonic Motivation (HM) ($r=.664$, $p<.01$) has the highest correlation to the dependent variable. Habit (HT) ($r=.645$, $p<0.01$) has the 2nd highest correlation to the dependent variable. Then it is followed by Social Presence (SP) ($r=.580$, $p<0.01$), Interactive Learning (IL) ($r=.561$, $p<0.01$), Effort Expectancy (EE) ($r=.539$, $p<0.01$), Device Usability (DU) ($r=.467$, $p<0.01$) and Performance Expectancy (PE) ($r=.256$, $p<0.01$). All seven variables exhibited significant relationships with Behavioral Intention (BI) to use a Facebook private study group for mobile learning.

5.7.7 Hypotheses testing

This study used multiple linear regression analysis to test the hypotheses using SPSS. The seven influential variables derived from previous research, i.e. Performance Expectancy (PE), Habit (HT), Device Usability (DU), Effort Expectancy (EE), Social Presence (SP), Interactive Learning (IL) and Hedonic Motivation (HM) were applied as independent variables, while Behavioral Intention (BI) was used as a dependent variable. Table 5.17 showed the results of the regression analysis. All seven independent variables were considered to have significant relationships with 'behavioral intention to use a Facebook private study group for mobile learning' (BI) with p -values $<.01$. They were Performance Expectancy (PE), Habit (HT), Device

Usability (DU), Effort Expectancy (EE), Social Presence (SP), Interactive Learning (IL) and Hedonic Motivation (HM).

Table 5.17: The coefficients of independent variables^a

Independent variable	B	Beta (β)	t-value	Sig.
Performance Expectancy (PE)	.167	.151**	2.847	.005
Habit (HT)	.181	.190**	2.746	.007
Device Usability (DU)	.168	.175**	3.217	.002
Effort Expectancy (EE)	.166	.183**	3.046	.003
Social Presence (SP)	.201	.208**	3.359	.001
Interactive Learning (IL)	.177	.199**	3.414	.001
Hedonic Motivation (HM)	.217	.218**	3.284	.001

a. Predictors: PE, HT, DU, EE, SP, IL, HM

** p<0.01, ***p<0.001

As indicated by the results of multiple linear regression analysis, all seven variables show significant and positive associations with behavioral intention to use the Facebook private study group for mobile learning, i.e. Performance Expectancy (PE), Habit (HT), Device Usability (DU), Effort Expectancy (EE), Social Presence (SP), Interactive Learning (IL) and Hedonic Motivation (HM). As shown in table 5.18, the adjusted R square suggested that 70.1% of the behavioral intention to use the Facebook private study group for mobile learning's variance can be explained by these seven variables ($F = 41.856$, $p < .001$) (Table 5.19). The model generated from the multiple linear regression analysis has a reasonable level of representativeness in the selected predictor variables. The SPSS outputs of multiple linear regression analysis are shown in Appendix 12.

Table 5.18: Research model summary^b

R	R Square	Adjusted R Square
.847 ^a	.718	.701

a. Dependent variable: BI

b. Predictors: PE, HT, DU, EE, SP, IL, HM

Table 5.19: ANOVA

	Sum of Squares	df	Mean Square	F
Regression	258.618	7	36.945	41.856**** ^a
Residual	101.508	115	.883	
Total	360.127	122		

a. Predictors: PE, HT, DU, EE, SP, IL, HM

** p<0.01, ***p<0.001

Hypothesis 1 (see section 3.3.1) examines the association of Performance Expectancy with Behavioral Intention. It is supported, with $\beta=0.151$ and p-values less than .01 and is significant. Hypothesis 2 examines the relationship between Effort Expectancy and Behavioral Intention. It is supported where Effort Expectancy has a significant positive association with Behavioral Intention ($\beta=0.183$, $p<.01$). Hedonic Motivation has a strong, significant and positive association with Behavioral Intention ($\beta=.218$, $p<.01$). Therefore, Hypothesis 3 is supported. Hypothesis 4, Habit has a positive association with Behavioral Intention ($\beta=0.190$, $p<.01$). Thus, Hypothesis 4 is supported. Hypothesis 7, Social Presence has a positive association with Behavioral Intention ($\beta=0.208$, $p<.01$). Thus, Hypothesis 7 is supported. Hypothesis 5 examines the association of the Device Usability with Behavioral Intention. It is supported, with $\beta=0.175$ and p-values less than .01 and is significant. Hypothesis 6 examines the relationship between Interactive learning and Behavioral Intention. It is supported where Interactive Learning has a significant positive association with Behavioral Intention ($\beta=0.199$, $p<.01$).

5.7.8 Quantitative data analysis results

Quantitative data analysis aims at testing hypotheses. It includes a number of tests to check the validity of collected data and examines the relationships between variables. Table 5.20 summarizes the test, purpose and interpretation in quantitative data analysis.

Test	Purpose	Results and interpretation
Mann–Whitney U-test	gender difference	Gender difference exists in the variable of effort expectancy. Box plot shows that male has relatively higher average score in effort expectance. This implies

Test	Purpose	Results and interpretation
		male students think that using Facebook for mobile learning is easier.
Kruskal Wallis Test	age group difference	Age group differences exist in the variable of performance expectancy, device usability, hedonic motivation, social presence and interactive learning. Box plots show that older age groups have higher average score in device usability, hedonic motivation and social presence. It may be due to higher degree of self-worth for younger students.
Factor analysis	Group survey responses into multiple observed variables	Eight components have been identified from factor analysis where these eight components match the indicators, i.e. survey questions, in the questionnaire. The results of factor analysis imply that there is no component mixed with other component. The components are appropriate for multiple linear regression.
Reliability and validity analysis	Cronbach's α values for each variable	The values of eight variables are above .72, an acceptable threshold implying that variables, i.e. performance expectancy, habit, device usability, effort expectancy, social presence, interactive learning, hedonic motivation and behavioral intention are reliable.
Pearson correlation analysis	Check the correlations between variables	The values of seven variables, i.e. performance expectancy, habit, device usability, effort expectancy, social presence, interactive learning and hedonic motivation, show their correlations to behavioral Intention to use a Facebook private study group for mobile learning.
Multiple linear regression	Hypotheses testing	The coefficients of independent variables i.e. performance expectancy, habit, device usability, effort expectancy, social presence, interactive learning and hedonic motivation, show that they have positive significant relationship to use a Facebook private study group for mobile learning.

Table 5.20 summarizes the test, purpose and interpretation in quantitative data analysis.

Based on prior research, this research proposed a theoretical research model to investigate the factors influencing student acceptance of Facebook private study groups for mobile learning. In this study, seven constructs were employed to test the use behavior in the context of Facebook private study groups via smartphones. The results showed that performance expectancy, effort expectancy, habits, hedonic

motivation, social presence, device usability and interactive learning have significant positive associations with behavioral intention to use Facebook private study groups for mobile learning. In terms of performance expectancy and effort expectancy, our findings corroborate research including Chiu & Wang (2008), Chen et al. (2011), Paola et al. (2011), Bakar et al. (2013), Oshlyansky et al. (2007), Tan (2013), Shin (2009), Cheung & Vogel (2013), Wang et al. (2009), Venkatesh, Thong & Xu (2012), Oechslein (2014), Raman & Don (2013) and Slade et al. (2013). In terms of habit and hedonic motivation, our findings corroborate prior studies by Venkatesh, Thong & Xu (2012), Oechslein (2014), Raman & Don (2013) and Slade et al. (2013). The research results of social presence are in alignment with prior research findings (Cheung et al., 2011; Shin & Kim, 2008; Shen, 2012) whereas device usability findings are consistent with the research results of Park (2009), Gu et al., (2009) and Lin (2006). Last but not least, our results for interactive learning corroborate prior research work (Liaw, 2008; Liaw & Huang, 2013; Liu et al., 2010). Therefore, this research has successfully applied the theoretical model (developed using constructs from Unified Theory of Acceptance and Use of Technology 2, Social Presence Theory and other prior studies) to the context of Facebook private study groups for mobile learning. However, it is necessary to examine some of the statistical results from the quantitative analysis. Firstly, the adjusted R square value is 70.1% (Table 5.17). Although the research model can explain 70.1% of this IT phenomenon, the other 29.9% cannot be explained, which needs further exploration. Secondly, the coefficients (Table 5.20) reflect the degree of significance between independent and dependent variables, for instance, Performance Expectancy and Behavioral Intention. Hedonic Motivation (HM) has the strongest association with Behavioral Intention (BI), which is followed by Social Presence (SP), Interactive Learning (IL), Habit (HT), Effort Expectancy (EE), Device Usability (DU) and Performance Expectancy (PE). Performance expectancy has the smallest association with behavioral intention. Table 5.21 summarizes the quantitative data analysis results.

Table 5.21: Summary of quantitative data analysis results

Hypothesis	Relationship with Behavioral intention	Hypothesis	Ranking based on coefficients β	Results
H1	Performance expectancy	Positive & significant	7th	Supported
H2	Effort expectancy	Positive & significant	5th	Supported
H3	Hedonic motivation	Positive & significant	1st	Supported
H4	Habit	Positive & significant	4th	Supported
H5	Social presence	Positive & significant	2nd	Supported
H6	Device usability	Positive & significant	6th	Supported
H7	Interactive learning	Positive & significant	3rd	Supported

This chapter has shown the research results, performed a factor analysis to validate the factors and analyzed the data using multiple linear regression. The quantitative data analyzed in this chapter is discussed in Chapter 8 which covers the implications and contribution.

6 Data collection and analysis (Qualitative research)

This chapter explains data collection and analysis in qualitative research. This includes (1) qualitative research; (2) focus group interview arrangements; (3) measurement development; (4) pilot study; (5) research ethics; (6) data analysis technique; and (7) quantitative data analysis.

6.1 Qualitative research

Qualitative research focuses on a wider range of variables than a positivist approach and helps us to understand the complicated relationships between these variables. It is a research methodology related to the constructivist paradigm and phenomenology (Bryman and Bell, 2015). In addition, Qualitative research is used in the mixed method of Pragmatism. The benefit of a mixed method with qualitative research is to compensate for the weaknesses of quantitative research, in terms of (1) difficulty in quantifying factors, for instance, beliefs; (2) difficulty in conducting large scale research; (3) difficulty in generalizing the results due to a small sample size (Carr, 1994; Choy, 2014). Furthermore, with qualitative research, subjective information, i.e. interpretations, opinions and ideas of the respondents, can be explored and linked to the objectives of the research. These can help answer the ‘How?’ and ‘Why?’ questions. In other words, the use of qualitative research can help improve the quality and richness of the research outcomes and triangulate the quantitative research results (Creswell, 2013).

6.2 Focus group interview arrangements

After the survey and quantitative analysis, qualitative research is carried out through focus group interviews. Focus group interviews are chosen instead of in-depth interviews because focus group interviews provide opportunities for interaction and communication between interviewees and elicit group context opinions towards using the mobile Facebook private study group as opposed to personal opinions (Gibbs, 1997; Ritchie et al., 2013). The ethical issue of the research must be addressed before the interviews can be carried out. Participants are required to read the invitation letter (Appendix 5), information sheet (Appendix 6) and sign the survey consent form

(Appendix 7) about the interviews being audio recorded, the purpose of the focus group interview, the benefits and risks of participating in the focus group interview and the issues of storing collected data. Sampling plays an important role in qualitative method. There are two types of sampling strategy, namely, (a) participants and (b) random/convenience. Random sampling is the process of selecting respondents using certain kinds of random selection method, whereas purposive sampling selects certain categories of participants in a non-random way (Robinson, 2014). In the research of technology acceptance, some scholars have revealed the mediating effects of age and gender (Wang, Wu, Wang, 2009; Salim, 2012). Therefore, a purposive strategy would help categorize participants in order to examine if there are differences in their attitudes towards the phenomenon in question (Robinson, 2014). Purposive sampling is adopted for qualitative research. The technique of purposive strategy is homogeneous sampling, a sampling technique which is able to categorize participants by their characteristics or traits (Weiser, 2000; Huffaker & Calvert, 2005). Therefore, this research makes use of a homogeneous sampling technique by inviting preselected participants categorized by gender for the focus group interview (6 – 8 students) from 30 to 45 minutes. Their ages range from 18 to 29. Participants were asked a set of predetermined open-ended questions to collect their feedback about using the Facebook private group for mobile learning. The order and stages of discussion were (1) introduction, (2) opening questions and background, (3) core group discussion questions from general to more specific, including explanatory questions, (4) closing questions including future use and suggestions. In order to ensure confidentiality, basic demographic information was collected, i.e. the gender, age group, programme and course. Other detail personal information, for instance, student name and ID, were not collect to ensure anonymity. During the interview, the moderator was required to (1) promote the debate on the core topic, (2) challenge participants to express different opinions, (3) ask for details about their opinions, (4) drive participants back if the conversation is diverted to other unrelated topics (Bricki & Green, 2007). The interviews were audio recorded and ranged from 30 to 45 minutes and were then transcribed into transcripts (in electronic format).

6.3 Outline of the focus group interview questions

Guiding and exploratory questions were used based on qualitative research into the use of mobile computing devices in higher education by Gikas & Grant (2013). They attempted to explore student feedback about using smartphones, cellphones and social media as a way of mobile learning. Gikas & Grant (2013) collected student feedback using focus-group interviews. Their findings revealed that participants recognized the trend for mobile learning and its benefits despite the physical limitations of a smartphone. Table 6.1 shows their interview guiding questions. In view of the similarity in the context of our research studies, their guiding questions for focus group interview were adopted in this research. Appendix 8 shows all the guiding questions used as a guide to achieve the research objectives. The guiding questions were aimed at (1) collecting respondents' opinions towards using the Facebook private study group for mobile learning; and (2) triangulating the results of quantitative research, i.e. validating the significant positive associations of the constructs with behavioral intention. The exploratory questions were aimed at (1) exploring respondents' other opinions on the Facebook private study group for mobile learning in terms of other factors affecting their attitude and intention; and (2) exploring their attitude towards mobile learning.

Table 6.1 Open-ended questions adopted from literature in mobile learning

Source of guiding questions: Gikas & Grant (2013)	
Part 1:	<ul style="list-style-type: none"> • What are the changes to the learning environment when mobile computing devices are integrated?
Part 2:	<ul style="list-style-type: none"> • Can you describe the course where you used mobile computing devices? • Tell me how that is different from a course not using mobile computing devices? • Tell me what your role was in interacting with the mobile technology? • Tell me about your teacher's expectation of your interaction with the mobile computing device? • What did they expect from you? • How did that impact your understanding of the content?
Part 3:	<ul style="list-style-type: none"> • What did you use the device for in the course? • How did you interact with classmates/teachers using the device? • What type of activities did you use the device for in your course?

Source of guiding questions: Gikas & Grant (2013)

Part 4:

- What changes do you see in the learners when you used the mobile computing devices?
- Tell me about the experience of using mobile computing devices in the learning environment.
- Tell me how that's different from a course not using mobile computing devices.

Part 5:

- What change did you see in the learner's behavior? What types of change did you see in the student interaction with the content?
- Tell me about the student interaction with the devices — what course related activities did they use it for?

Part 6:

- How were the devices used for communication?

6.4 Data analysis technique

In qualitative research, content analysis is used to analyze the transcribed data (Gibbs, 1997; Bricki & Green, 2007; Ritchie et al., 2013). Due to the narrative and subjective nature of qualitative research, the content of the research is scattered and unlike the discrete nature of quantitative data. In order to analyze the qualitative research content systematically and objectively, qualitative content analysis provides a quantitative approach to interpret the content (Berelson, 1952; Kohlbacher, 2006). This includes (1) reading and annotating transcripts, (2) identifying themes, (3) developing a coding scheme, and (4) coding the data. Thus, the narrative data is analyzed and interpreted by content analysis using qualitative analysis software, MAXQDA (Gikas & Grant, 2013; Patton, 2005). Qualitative analysis software provides a fast and efficient way of data analysis (Bazeley & Jackson, 2013), reduces data complexity (Schönfelder, 2011) and improves consistency (Bergin, 2011). The software operation steps include (i) using coding stripes; (ii) identifying and categorizing the possible nodes (categories) using auto coding; (iii) examining nodes manually against the research objectives and updating with node classification; (iv) querying matrix coding ; and (v) visualizing the data in the form of models or charts (Kaefer, Roper & Sinha, 2015).

6.5 Qualitative data analysis

Content analysis was used to interpret the collected raw data. The analysis included (1) interpreting the content of text data, (2) classifying data by coding, (3) identifying patterns, categories and themes (Nandy & Sarvela, 1997). Among three different approaches to content analysis, namely, conventional (inductive), directed (deductive) and summative (quantitative), conventional content analysis was chosen in this study because there were two major purposes of the qualitative research, i.e. the triangulation of quantitative results and exploration of other factors influencing students' adoption of the Facebook private study groups for mobile learning. A conventional approach could help validate whether the texts were classified into predefined categories of the research model, whereas uncategorized texts could be given new codes (Hsieh & Shannon, 2005). By using the Strauss and Corbin (1990) constant comparative method, the collected data was analyzed iteratively. Open coding was used to summarize and synthesize the data so as to identify the data patterns, which, in turn, developed a category of information. In this study, the constant comparison of the collected data was performed iteratively through 4 rounds of inductive analysis using open coding and priori coding (Biklen, 2003). To this end, MAXQDA, qualitative data analysis software, was used. With qualitative data analysis software, it is easier to identify similarities, extract themes, identify relationships, highlight differences and create generalizations. In MAXQDA, interview transcripts are imported where the content is analyzed using 'Codes'. There were three major steps (1) Code, (2) Category, and (3) Theme. The purpose of 'Code' was to label any phrases or sentences that shared a common idea or meaning. Step 2 'Category' was used to group similar codes together so as to reduce the scattered data. 'Theme' was performed to categorize different categories into major elements. Table 6.2 showed the code system of the content analysis (Basil, 2003; Bazeley & Jackson, 2013). Five themes were categorized after content analysis, i.e. (1) Advantages of using the Facebook private study group for mobile learning; (2) Concerns about using the Facebook private study group for mobile learning; (3) Factors influencing students to use the Facebook private study group for mobile learning; (4) Reasons behind using Facebook; and (5) Reasons behind using a smartphone.

Table 6.2: The code system of the content analysis

Theme	Category	Code
Advantages of using the Facebook private study group for mobile learning	Communication	<ul style="list-style-type: none"> • Instant messaging • Post message & response • Instant notification
	Interaction and collaboration	<ul style="list-style-type: none"> • Instant voting • Discussion • Knowledge sharing & contribution
	Access to course materials	<ul style="list-style-type: none"> • Supplementary notes • Smartphone access
	Search for internet information	<ul style="list-style-type: none"> • Google search • Wikipedia • Google translate • Up-to-date information
	Convenience and ease of use	<ul style="list-style-type: none"> • Facebook mobile app • Facebook instant messenger • Facebook usage experience
Concerns about using the Facebook private study group for mobile learning	Physical limitations of smartphones	<ul style="list-style-type: none"> • Small screen • Small virtual keyboard • Unstable WIFI • Short battery life
	Role of social media	<ul style="list-style-type: none"> • Not designed for education • Privacy • Distraction
	Distraction by the smartphone	<ul style="list-style-type: none"> • App notification • Email, SMS, messages • Mobile games
Factors influencing students to use the Facebook private study group for mobile learning	Habit	<ul style="list-style-type: none"> • Daily routine • Learning habit
	Performance expectancy	<ul style="list-style-type: none"> • Collaboration • Interaction • Learning support
	Effort expectancy	<ul style="list-style-type: none"> • Smartphone • Facebook
	Hedonic motivation	<ul style="list-style-type: none"> • Entertaining • Joy
	Interactive learning	<ul style="list-style-type: none"> • Group discussion • Awake

Theme	Category	Code
	Device usability	<ul style="list-style-type: none"> • Internet access • Mobility • Mobile applications
	Social presence	<ul style="list-style-type: none"> • Communication • Peer relationship • Teacher-student relationship
	Subjective and social norms	<ul style="list-style-type: none"> • Sense of belonging • Participation
Reasons behind using Facebook	Friends	<ul style="list-style-type: none"> • Join Facebook together • Friends are on Facebook
	Content sharing	<ul style="list-style-type: none"> • 'Share' and 'like' functions • Text, photos and videos
	Source of news	<ul style="list-style-type: none"> • Seldom read newspapers • Latest news • Interesting news
	Facebook group	<ul style="list-style-type: none"> • Many interested groups • Group creation for free
	Entertainment	<ul style="list-style-type: none"> • Facebook games • Read posts on wall • Watch videos
	Simplified registration	<ul style="list-style-type: none"> • Link Facebook account • Bypass registration and activation procedure
Reasons behind using smartphones	Functions	<ul style="list-style-type: none"> • Many mobile applications • Backward compatibility
	Mobility	<ul style="list-style-type: none"> • Support wireless connection • Small size and light weight
	Multimedia support	<ul style="list-style-type: none"> • Video and audio recording • Video and audio playing
	Personal assistant	<ul style="list-style-type: none"> • Record bookings, events, appointments, meetings • Calculator • Morning alarm
	Entertainment	<ul style="list-style-type: none"> • Online games • Mobile games • Online videos • Social media

6.5.1 Finding 1 – Advantages of using Facebook for mobile learning

Focus group students mentioned various advantages of using the Facebook private study group for mobile learning. These advantages are categorized into (i) communication, (ii) interaction and collaboration, (iii) access to course materials, (iv) internet search for information, and (v) convenience and ease of use.

6.5.1.1 Communication

Within the Facebook private study group, students admitted that communication was an important factor in their learning. This was because communication occurred when (a) the teacher gave learning instructions to students; (b) students responded to the teacher in class activities; (c) the teacher gave feedback; (d) students discussed certain topics and (e) presentation. Students agreed that the various communications could encourage them to learn using their smartphone. Furthermore, the communication provided by Facebook was instant messaging where students and teachers were notified immediately via their smartphone whenever someone posted a message on the study group. This instant messaging service, as mentioned by students, was far faster than email and the discussion forum of MOODLE. Furthermore, they pointed out that they preferred Facebook instant messages to WhatsApp. This was due to the privacy issue because they didn't want to disclose their phone number. Another important benefit of communication described by students was direct communication with peers and teachers in case of learning problems. Students said smartphones provided excellent convenience for them so that they could communicate with peers and teachers anywhere, anytime. Furthermore, most teachers had the Facebook mobile application and Facebook instant messenger installed on their smartphones so most teachers could respond to student messages promptly.

Student G [Female, age group 18-21] shared her experience:

“I have Facebook app installed in my smartphone. When someone posts something on the study group, my smartphone will notify me with sound or vibration. I can see from

Facebook private study group who is online so that I can talk to.”

In the case of a group project, students could communicate with their teammates quickly, which, in turn, improved their learning effectiveness.

Student J [Male, age group 18-21] shared his idea:

When I have problems with assignments, I usually interact with classmates and teachers using email and messenger.”

6.5.1.2 Interaction and collaboration

Students mentioned in the focus groups that the Facebook private study group using a smartphone did offer more opportunities for interaction and collaboration while working on group discussions, because each group member could use their smartphone to find relevant and useful information for knowledge sharing and contribution. In addition to group collaboration, students agreed about the benefit of class-wide collaboration where the whole class of students worked together on certain topics like SWOT analysis of SCS or promotion strategies for e-commerce. Students mentioned this kind of knowledge construction activity was very helpful for them to learn, compared to traditional teacher knowledge delivery via PowerPoint presentation.

Student L [Female, age group 22-24] shared:

“Facebook study group does not only change the learning atmosphere in class but also the learning attitude of classmates, including the motivation, engagement and participation.”

6.5.1.3 Access to course materials

Most of the focus group students agreed about the convenience of accessing course materials from the Facebook private study group using their smartphone (as shown in Figure 6). They could either download all learning materials locally or access through

the internet. Furthermore, students pointed out that smartphones were a powerful computing device that had become part of their daily life.

Student B [Male, age group 18-21] shared his usage:

“After using smartphone for class activity, I find that smartphone can help study in different ways. This includes (1) storing course materials for studying, (2) searching Wikipedia for useful information, (3) using Google drive and Google docs for doing assignments, (4) participating in class learning activities over Facebook study group, (5) using camera to take photos of teacher writing on whiteboard and (6) doing audio recording of the lecture.”

6.5.1.4 Search for internet information

Most of the focus group students described their reliance on the internet to search for information via a search engine. Students mentioned that the information available from the internet was far more than a textbook could provide. Furthermore, they agreed that the information available from the internet was up-to-date.

Student K [Female, age group 18-21] had examples:

“I think smartphone is an effective device for learning because I am always carrying it in my pocket and I can quickly access my course materials and search for useful online learning information. Most importantly, the online information is really up-to-date. For instance, my marketing textbook doesn’t tell me what is Omni-channels of promotion, Online-2-Offline, Click-n-Collect E-Commerce business strategies.”

Therefore, they said their learning behavior was inclined towards the internet and their knowledge was mainly coming from the internet. In this respect, students mentioned that searching for information on the internet was very important to their school work

and studies. Fortunately, smartphones did provide internet-ready features and search engine support for their daily studying.

Student J [Male, age group 18-21] shared:

“I can make use of internet resources via my smartphone in learning like Google translate, Wikipedia, Oxford Online Dictionary, etc.”

6.5.1.5 Convenience and ease of use

Students in the focus group interviews described the Facebook private study group for mobile learning as being convenient in two ways. Firstly, they commented that they already have a smartphone with Facebook applications installed. This meant they didn't need to buy or rent a mobile device for study and they didn't need to install new applications. Secondly, students said that they didn't need to learn a new mobile application for the purpose of mobile learning.

Student C [Female, age group 18-21] shared:

“I think it is good because I am using Facebook and smartphone every day and I don't need to learn how to use the system like MOODLE.”

Student P [Female, age group 22-24] shared:

“Because the posts on the wall of Facebook study group is presented in form of timeline, if I am absent from class, I can simply visit the Facebook study group and see what has happened in class.”

6.5.2 Finding 2 - Concerns about using Facebook for mobile learning

Focus group students mentioned their concerns about using the Facebook private study group for mobile learning. These concerns are categorized into (i) the physical limitations of smartphones; (ii) social media for learning; (iii) distraction by smartphones in class and (iv) too many Facebook private study groups.

6.5.2.1 *Physical limitations of smartphones*

Even though most of the students in the focus group interviews expressed positive feedback about using the Facebook private study group for mobile learning, there were some students who showed their concerns about the physical limitations of smartphones. They pointed out the main limitation was the small screen size even if it was a 5.5” - 6” smartphone, because they needed to keep zooming in and out on the document or photos. Furthermore, the small virtual keyboard of the smartphone was another barrier to mobile learning using a Facebook private study group because it was inconvenient if they needed to type lengthy answers to post on the wall of the Facebook private study group.

Student K [Female, age group 18-21] admitted the physical limitation of smartphones:

“I think most of the course materials become electronic version, which in turn, the learning content can be stored on the Internet like Dropbox or Google drive or Facebook group or stored in my smartphone. It is very convenient for me while learning and studying. I can simply bring my smartphone to attend the class. I can search for the specific content I want in the English eBook and translate it using Google Translate. I can also click the reference link in the learning materials or eBook so that I can visit the internet for additional information or online resources including news, articles, audios and videos. With smartphone, I can do this anywhere anytime. Electronic content is far better than traditional printed content in learning and studying. But I would like to raise the issues of small screen and keyboard while using smartphone.”

They complained about eye strain problems due to interacting with the screen too long reading case studies, searching for information or typing text. Furthermore, students found that their smartphone ran out of battery easily while using Facebook and accessing the internet for in-class activities or self-studying for too long. Although

most students had their own 4G LTE data service for their smartphone, some students mentioned slow school WIFI internet services.

Student H [Male, age group 18-21] shared:

“I think mobile learning is good but sometimes my smartphone does not have long battery life for class activities. Furthermore, my eyes are very tired after reading the document in small screen of my phone. Another problem is slow speed of school WIFI which takes me a bit long time to download course materials.”

6.5.2.2 Social media for learning

In the focus group interviews, a few students disagreed with the use of social media for learning because they said the purpose of a social networking site, for instance, Facebook, was mainly for social communication, interaction and sharing rather than offering educational tools like assignment submission, tests/quizzes, that were provided by MOODLE (Manca & Ranieri, 2013). Furthermore, students were easily distracted by the posts of their friends and messages received.

Student H [Male, age group 18-21] shared:

“Personally, I don’t like Facebook because it is a social media and used primarily for social interaction and communication. I also notice that some of my classmates are distracted to other Facebook activities like chatting or viewing the sharing of others in-class. However, when I am using Facebook study group, I am sometimes distracted by friend messages or post.”

6.5.3 Finding 3 - Factors affecting mobile learning adoption

Focus group students mentioned what the factors were that influenced them to use the Facebook private study group for mobile learning. These factors are categorized into

(a) habit; (b) performance expectancy; (b) effort expectancy; (d) hedonic motivation; (e) interactive learning; (f) device usability; (g) social presence and (h) subjective and social norms.

6.5.3.1 Habit

In the focus group interviews, many students described their smartphone and Facebook usage behaviors as a habit. Some mentioned that they were using Facebook every day and spent more than six hours a day on their smartphone. Habit is a kind of subconscious or automatic behavior, in contrast to intention which belongs to conscious behavior (Limayem & Hirt, 2003). A habit of using technology for learning is important to the learning habit as well. With an effective learning habit, students can manage their study through their smartphone, which, in turn, results in an advantageous daily routine and time management (England.edu, 2016). Students in the focus groups were delighted to use the Facebook private study group using their smartphone so that they could have more opportunities to use their smartphone and Facebook for learning purposes.

Student M [Female, age group 22-24] shared:

“I think the learning environment becomes fruitful after the use of smartphone for in-class activities because I can use it to find online information so that I can learn more. Using smartphone for class activities can further extend its usage in learning context. This can change my mobile phone usage habit from playing games, listening music, watching videos to learning.”

Student A [Male, age group 18-21] shared:

“I think I can’t survive without my smartphone because I always use my smartphone daily. And now, I start to use my smartphone for studying and search for online information for learning. I prefer using Facebook study group because I can contact teacher quickly.”

Therefore, their responses are consistent with the findings reported by other scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model.

6.5.3.2 Performance expectancy

In the focus group interviews, most of the students mentioned that ‘efficiency’ made them prefer using the Facebook private study group for mobile learning. They pointed out that instant messaging could enable quick chat and response in peer communication. They could contact the teacher directly in case of learning difficulties. These factors could improve their learning effectiveness. Furthermore, they mentioned that learning through the Facebook private study group in classroom learning activities could make the lesson more interactive and increase their motivation in the lesson. The learning activities helped them learn the course materials easily. Furthermore, students preferred using smartphones to computers because they explained that many of the functions could be done using a smartphone which was portable and internet-ready so that they could study and access learning materials anywhere, anytime.

Student B [Male, age group 18-21] shared:

“The smartphone has multitasking feature that I can use it for different functions during study.”

Student N [Male, age group 25-29] shared:

“I think I prefer a single device that can let me read, listen, watch, calculate, organize, share, communicate, upload, download, taking photo, record audio/video, ... etc. that smartphone can do all these for me. And I can save my time for studying.”

Another student [Female, age group 22-24] expressed her concern about performance because of multiple platforms.

Student Q [Female, age group 22-24] shared:

“Smartphone is really a great portable device for studying but Facebook and MOODLE are two platforms that it is inconvenient to switch between both platforms when accessing course information and materials.”

In view of the built-in functions and mobility features of smartphones, students agreed that their learning efficiency was improved. Therefore, their responses are consistent with the findings reported by other scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model. On the other hand, different points of view exist among different age group of students in this respect.

6.5.3.3 Effort expectancy

In the focus group interviews, most of the students described the use of the Facebook private study group for mobile learning as being zero-effort because it didn't require the use of a new device or learning platform. They could simply use their smartphone which already had the Facebook mobile app installed. The smartphone and Facebook were things they used frequently and they had acquired the necessary knowledge and skills in using them. Therefore, it was 'effort free' for them to use the Facebook study group for mobile learning. Both male and female students showed positive responses towards using Facebook for mobile learning.

Student A [Male, age group 18-21] shared:

“I think it is my hobby because I use my smartphone to access Facebook every day and it costs me zero-effort to access the Facebook study group.”

Student K [Female, age group 22-24] shared:

“Using Facebook study group is definitely beneficial and convenient because I always spend hours on Facebook daily to read my friend’s posts and I can keep track any news of my course simultaneously. And it is also easy for me to contact classmates and teachers whenever I have questions in studying.”

In addition, students mentioned that the user-friendly user interface of Facebook and smartphones made them feel comfortable using it. Compared to MOODLE, students said they used it mainly for downloading course materials or uploading assignments, which meant they used MOODLE occasionally. Therefore, their responses are consistent with the findings reported by other scholars (Thomas, Singh & Gaffar, 2013; Yang, 2013; Cheon et al., 2012; Nassuora, 2012; El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Slade et al., 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model.

6.5.3.4 Hedonic motivation

In the focus group interviews, most of the students described the Facebook private study group for mobile learning as being preferable because they said that the activities were entertaining, and they enjoyed participating in the activities so that they could learn easily. They mentioned that they felt excited while competing with classmates or groups in posting arguments to the wall of Facebook private group.

Student F [Male, age group 18-21] shared:

“I think it would be fun if we can search special online information as answers that makes teachers and classmates feel surprised.”

Student A [Male, age group 18-21] shared:

“I like it because the lesson becomes more funny and entertaining.”

Another student [Female, age group 25-29] in the focus group expressed her concern about distraction while using Facebook for mobile learning.

Student H [Female, age group 25-29]

“Though Facebook learning activities using smartphone is really interactive and entertaining for me, not all my classmates are keen on participating in learning activities. There are some classmates being distracted and doing something else including watching YouTube and checking WhatsApp.”

Hedonic motivation is about the influence of people's pleasure and pain and the subsequent desire to achieve a goal or move away from risk (Ahtola, 1985). Their responses can be explained by (1) Schacter, Gilbert & Wegner (2011) that pleasure-seeking is one of the fundamental elements of all motives which happen in both animals and humans; and (2) Waterman et al., (2008) that intrinsic motivation is a function of hedonic enjoyment and personal expressiveness. Thus, hedonic motivation plays an important role in attitude and intention to use. Therefore, their responses are consistent with the findings reported by other scholars (Huang, Lin & Chuang, 2007; Cheon et al., 2012; Bere, 2014 April; Lowry et al., 2012; Tarhini, Mohammed & Maqableh, 2016, El-Masri & Tarhini, 2017) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model. On the other hand, different points of view exist among different age groups of students in this respect.

6.5.3.5 Interactive learning

In the focus group interview, students preferred the variety of the Facebook private study group in-class activities because they liked the interaction and collaboration in learning, especially in group discussions. Furthermore, they mentioned that the lesson was boring if there was a teacher PowerPoint presentation. Some of them said they were awake if they were given the chance to use smartphones and the Facebook

private study group learning activities required them to use smartphones. This kept them awake during the lesson.

Student B [Male, age group 18-21] shared:

“I like using Facebook private study group for mobile learning because it makes the lesson more interesting and interactive. And I don’t fall asleep or daydream in class.”

Student I [Female, age group 18-21] shared:

“I prefer using Facebook private study group for mobile learning because I can express my views over the wall of the group and receive feedback from teacher. I can also have chance to work with my classmates in group activities. I realize that the learning activities can help me reflect on what I have learned and remember the core concepts of the subject easily.”

Another student [Female, age group 25-29] in the focus group expressed her concern about the extent of interactive learning while using Facebook for mobile learning.

Student H [Female, age group 25-29] shared:

“Using Facebook for mobile learning is quite good in promoting the interactive learning. However, it really depends on the degree of student participation. My observation is that there are some classmates keep playing mobile games instead of participating Facebook group learning activities.”

Their responses are consistent with the prior research about the benefits of interactive learning, which include improved critical thinking and reasoning (Johnson et al., 2000), improved teacher-student, student-student interaction, improved communication (Irwin et al., 2012; Gikas & Grant, 2013; Moghavvemi et al., 2017), learning engagement and satisfaction (Dabbagh & Kitsantas, 2012; Tess, 2013; Heflin, Shewmaker & Nguyen, 2017), learning outcomes (Liaw, 2008) and learning

effectiveness (Holzinger et al., 2005; Tan & Liu, 2004; Fallahkhair et al., 2005). Therefore, their responses are consistent with the results reported by other scholars (Chen, Kao & Sheu, 2003; Uden, 2006; Hoppe et al., 2003) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model. On the other hand, different points of view exist among different age groups of students in this respect.

6.5.3.6 Device usability

In the focus group interviews, students had opposing views over device usability. All of them agreed that computation power, functions and internet connectivity features could enable them to experience mobile learning through Facebook private study group learning activities. The majority of them accepted the small screen size and keyboard for typing responses and posting on the wall of the group. Among 16 focus group students, there were two students who raised concerns about the inconvenience of the small screen size, small virtual keyboard, eye strain due to long time usage, low battery life, and slow school WIFI.

Student J [Male, age group 18-21] shared:

“I think mobile learning is easy to use except, sometimes, the screen is small, and it is difficult to use the keyboard to type too many words. And I have come across connectivity problem with school MOODLE that responds very slowly or even cannot be accessed. This makes me feel edgy and grief if I need to submit assignment.”

It was found that some students, [Female, age group 25-29] and [Male, age group 22-24], were quite keen on using their smartphones.

Student H [Female, age group 25-29] shared:

“I totally agree smartphone is a powerful portable device in terms of daily usage and entertainment. I am really happy about teacher putting the course materials online and having

Facebook study group so that I can use my phone for learning.”

Student E [Male, age group 22-24] shared:

“My smartphone is the top model of the series because I want to empower it by installing many mobile apps. My model has 6” big screen that I can use, play and study easily. The touch screen, camera, GPS and accelerometer sensor make my smartphone extremely useful playing and doing assignments.”

Therefore, their responses are consistent with Siau et al.’s (2001) arguments on the limitations of smartphones. Student responses are consistent with the findings reported by other scholars (Chen et al., 2003; Lonsdale et al., 2004; Kukulska-Hulme, 2009; Ismail, Johari & Idrus, 2010; Liu, Li & Carlsson, 2010; Shin et al., 2011; Mtebe & Raisamo, 2014) and provide evidence to explain the relatively weak association of device usability to behavioral intention in quantitative data analysis of the theoretical research model. On the other hand, different points of view exist among different age groups of students in this respect.

6.5.3.7 Social presence

In the focus group interviews, students’ responses were quite consistent. They expressed their preference for using Facebook as the media of communication because of its convenience and efficiency. Furthermore, students described a smartphone as an effective device for communication because of its mobility and the Facebook mobile application that notified them promptly. They preferred using the Facebook private study group for mobile learning because of the sense of learning community within the group. Students described the improvement in the peer relationship and teacher-student relationship which motivated them to learn. Students’ responses were not in alignment with the non-parametric test results of age difference.

Student L [Female, age group 22-24] shared:

“The class atmosphere is important to me. If my classmates are engaged in Facebook study group activities, I am engaged too.”

Student N [Male, age group 25-29] shared:

“I am quite happy about the peer effects from the Facebook study group because it improves the learning atmosphere.”

Their responses supported the argument of Garrison et al., (1999) that the educational experience can be improved through three important supporting elements, namely, the social presence, cognitive presence and teaching presence in the community of inquiry over CMC. Their responses imply a high degree of social presence could lead to their intention to use the Facebook private study group for mobile learning. Therefore, their responses are consistent with the findings reported by other scholars (Biocca, Harms & Burgoon, 2003; Shin et al., 2011; Smith & Sivo, 2012; Mtebe & Raisamo, 2014) and provide evidence to triangulate the results of quantitative data analysis of the theoretical research model.

6.5.3.8 Subjective and social norms

In the focus group interviews, students described their intention to use their smartphone for Facebook private study group learning activities because their classmates were participating in the activities. They said that they belonged to the study group. If they didn't respond or participate, classmates might not form a group with them for a future group project. Furthermore, some students said they didn't want to be labeled as lazy in class and therefore, they participated in the Facebook private study group activities using their smartphone.

Student C [Male, age group 22-24] shared:

“The peer effect from Facebook study group is strong because all my classmates of the course are in the group that you must show your involvement in group.”

Student K [Female, age group 22-24] shared:

“Classmates can see the performance of others which may affect their impressions on peers. Therefore, we have to be more engaged to learn in order to perform better.”

This phenomenon can be explained by the subjective norm. The subjective norm is defined as “the person’s perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein and Ajzen, 1975:302). As explained by Venkatesh (2003) in UTAUT, the subjective norm is a kind of social influence which is “the degree to which an individual perceives that important others believe that he or she should use the new system” (Venkatesh et al., 2003:451). Furthermore, the phenomenon reflects the presence of a social norm. According to Triandis (1980), the social norm is about what individuals think they should do. The research findings of Lucas & Spitler (1999) posit that the social norm is important to predict behavioral intention to use a technology. Lu et al. (2005) have similar findings that social norms are important in shaping the perception of an individual to accept and use a technology. Their arguments are supported by Schepers & Wetzels (2007) that social norms play an important role in affecting an individual’s behavioral intention to use a technology. Subjective and social norms were not included in this research and will be investigated in a future research study.

6.5.3.9 Summary of findings

Based on the findings above, the factors affecting the use of the Facebook private study group for mobile learning are (1) Habit, (2) Performance Expectancy, (3) Effort Expectancy, (4) Hedonic Motivation, (5) Interactive Learning, (6) Device Usability, (7) Social Presence and (8) Subjective & Social Norm. Therefore, the qualitative research results triangulate the quantitative research results.

When investigating the focus group students’ feedback, consistent findings existed in variables where age and gender differences in mobile learning adoption were reported by the non-parametric test in section 5.7.2. Table 6.3 summarizes the test in age and gender differences. The second column titled ‘Any age or gender difference in non-parametric test?’ summarized the non-parametric test results. The third column titled ‘Any opposite views in focus group interview?’ showed whether the respondents had consistent attitudes about the factors, i.e. the variables influencing them to use

Facebook for mobile learning. Although most age groups had consistent responses about whether ‘performance expectancy’ could influence them to adopt mobile learning, there were respondents who disagreed with it. Besides, there were respondents in age group 25-29 who did not think ‘hedonic motivation’ and ‘interactive learning’ could affect their use of Facebook for mobile learning, whereas other age groups had consistent feedback. Furthermore, there were respondents in age group 18-21 who expressed that ‘device usability’ was not a reason to enable them to accept mobile learning. On the other hand, the non-parametric tests indicated that gender differences existed in ‘effort expectancy’, but there were no respondents who showed negative responses about the positive influence of ‘effort expectancy’ on mobile learning. Finally, ‘Habit’ was the only factor which did not have any age or gender differences in the non-parametric tests and for which respondents’ feedbacks were consistent.

Table 6.3 Summary of the tests in age and gender differences in mobile learning adoption

Variable		Any age or gender difference in non-parametric test?	Any opposite views in focus group interview?
Performance expectancy	PE	Age	Yes [Age group 22-24]
Effort expectancy	EE	Gender	No
Habit	HT	-	-
Hedonic motivation	HM	Age	Yes [Age group 25-29]
Device usability	DU	Age	Yes [Age group 18-21]
Interactive learning	IL	Age	Yes [Age group 25-29]
Social presence	SP	Age	No

6.5.4 Finding 4 - Reasons behind using Facebook

In the focus group interviews, students explained the reasons behind using Facebook. They are (1) Friends, (2) Content sharing, (3) Source of news, (4) Facebook groups, (5) Entertainment, and (6) Simplified registration.

6.5.4.1 Friends

First, friends were using Facebook and, therefore, the students joined Facebook so that they could easily contact their friends and know their recent news.

Student A [Male, Age group 18-21] shared:

“All my friends are using Facebook and that’s why I am using. To be honest, I have no choice. But once, we all use Facebook, I can find my friends easily and know about their recent news easily.”

Student I [Male, Age group 22-24] shared:

“Although there are other social media choices like Google+, Facebook are very popular that most of my friends are using. In order to establish the connections with my friends, I need to use Facebook.”

6.5.4.2 Content sharing

Second, students described how Facebook ‘content sharing’ was an important feature to them. Students wanted to share texts, photos and videos and look at what others have posted.

Student J [Male, age group 18-21] shared:

“I like using Facebook because I can share text, photos and videos. I usually share the photos and videos of my oversea trips. Recently, I went to Tokyo, Japan with my family where I shared many interesting things in Japan. I also like to see what my friends share on Facebook.”

Student A [Male, age group 18-21] shared:

“I think Facebook is the simplest way of disseminating information. For instance, when I have received a fitness diet from friend, and I can easily share this diet to others. The same applied for fitness exercise videos because Facebook allows video sharing.”

6.5.4.3 Source of news

Third, some students relied on Facebook as their source of local news because they said many people posted the latest local news on Facebook for people to ‘like’. Some students shared:

Student B [Male, age group 18-21] shared:

“I seldom watch TV news or read newspaper but I always use Facebook. I get adapted to use Facebook every day. Eventually, I begin to use Facebook is my major source of news because many friends like to disseminate breaking news.”

6.5.4.4 Facebook group

Fourth, some students described the Facebook ‘group’ as being an important feature to them. According to students, there were many different kinds of groups on Facebook, including games, hobbies, interests, etc.

Student H [Male, age group 18-21] shared:

“I like using Facebook because I can easily create my Facebook group for events. I have created a group called ‘Hong Kong Hiking Meetup’ that can gather people in Hong Kong who like hiking and share where is a good place for hiking in Hong Kong. I can share the tips to beginners who want hiking.”

Student L [Female, age group 22-24] shared:

“Facebook have all my friends and old classmates. And I have Facebook alumni groups”

Student H [Female, age group 25-29] shared:

“I like using Facebook because there is much information, coupons, promotion on Facebook. I like some Facebook groups that have collected many coupons for local shops or oversea shops grouped by countries. It is very convenient.”

From the marketing perspective, it belongs to ‘benefit-sought’ customer behavior. However, ‘benefit-sought’ is a kind of motive in information seeking. Most of the groups in Facebook allow anyone to join freely by simply clicking ‘like’ button, except some private or secret groups which require group administrator authorization. Once you ‘like’ or make friends with someone on Facebook, you are notified frequently.

Student P [Female, age group 22-24] shared why he preferred using Facebook:

“I like using Facebook because it is easy for me to remember birthdays. You know, it is difficult to remember everything and Facebook birthday reminder helps me a lot. I can’t remember my friends’ phone number. Fortunately, I can call my friends directly using Facebook messenger.”

6.5.4.5 Entertainment

Fifth, some students described Facebook ‘entertainment’ as being an important feature to them. Although Facebook is a social networking site for online social interaction, there are many game companies developing games over Facebook.

Student A [Male, age group 18-21] shared:

“I like playing the Facebook games because the games are good time killer. I usually play Candy Crush Saga, Clash of Clans, and Subway Surfers. Recently, I like playing Tetris Battle with my friends.”

6.5.4.6 Simplified registration

Sixth, students described using Facebook because of its high penetration worldwide so that many websites embedded Facebook account registration and authentication directly. Students mentioned they would choose ‘Facebook account registration’ in order to skip time-consuming registration.

Student D [Male, age group 18-24] shared:

“There are many websites or even mobile apps that require login. If I have Facebook account, I can simply click ‘Facebook login’ and register or login directly”

6.5.5 Finding 5 - Reasons behind using smartphones

In the focus group interviews, students explained the reasons behind using Facebook. They are (1) functions, (2) portability, (3) multimedia support, (4) personal assistant, and (5) entertainment.

6.5.5.1 Functions

In the focus group interview, students explained the reasons behind using smartphones. First, students described the functions available as being comparable to a desktop computer or notebook; and the functions could be expanded through downloading more mobile applications.

Student E [Male, age group 22-24] explained:

“I think smartphone is very powerful that it can do most of the things that computer can do. For instance, I can open pdf, word, excel, PowerPoint files using my phone. It has drawing app similar to Microsoft Paint. It has internet browser that can connect to most of the websites.”

Student A [Male, age group 18-21] explained:

“There are unlimited mobile apps available that you can find whatever you want so that your smartphone can help you.”

Student B [Male, age group 18-21] explained:

“I can watch YouTube and Facebook videos.”

6.5.5.2 Multimedia Support

Second, students described the camera as being important because it could take photos and videos. Together with mobile sharing and internet connectivity, they could share photos and videos on social media including WhatsApp, WeChat, Line, Facebook, and Instagram.

Student G [Female, age group 18-21] explained:

“It is a powerful camera able to take photos and videos. I like to use 360 degree photo so that I can make a round image using Photoshop.”

Student K [Female, age group 18-21] explained:

“I can use WhatsApp to communicate and share photos/videos/pdf with others via my smartphone. Despite there is webpage version of WhatsApp on PC, I like to record my voice to send through WhatsApp instead of typing. Therefore, smartphone is better than notebook or desktop computer.”

Student M [Female, age group 22-24] explained:

“There are WhatsApp, WeChat, line, Facebook, Skype, and Instagram for me to communicate. These applications are really important because I have friends from South Korea, Japan, China, Taiwan, Hong Kong and UK. They are using different social media platforms and I need to use various social media to chat with them.”

6.5.5.3 Mobility

Third, students described smartphones as being mobile because it was handy, light-weight and has internet access.

Student B [Male, age group 18-21] said:

“I think smartphone is very convenient because it is handy, light-weighted. I don’t need to bring along a heavy notebook coz my smartphone can do most of the tasks. And I can carry it anywhere.”

6.5.5.4 Personal assistant

Fourth, a student mentioned that the role of a smartphone was like a personal assistant that (1) helped manage their daily matters and schedule; and (2) provided a lot of information.

Student J [Male, age group 18-21] said:

“It can help me manage my email, online accounts, and schedule on calendar, i.e. my important personal diary. I put all my appointments, bookings, lessons, activities on the build-in calendar. I also set up all my registered email accounts in my smartphone for better management.”

Student C [Female, age group 18-21] said:

“It provides useful information in my daily life and study. For instance, (1) morning call alarm; (2) weather app provides weather forecast information; (3) calendar reminds me when will be the assignment due date or exam dates.”

6.5.5.5 Entertainment

Fifth, students mentioned that one of the important uses is entertainment. Some students shared:

Student A [Male, age group 18-21] said:

“The smartphone is important to me because I can watch YouTube videos, listen to music, watch friends’ funny posts on Facebook and play games. I think I cannot survive without my smartphone.”

6.6 Summary of qualitative data analysis

Qualitative data analysis aims at triangulating the results of quantitative research and exploring the issues in related to this research. Table 6.4 shows research question 3 – 6 and table 6.5 summarizes the results of qualitative data analysis and how they address research questions in section 1.4.1.

Research question	
3	Is there any additional determinant that is important to student adoption of Facebook private study groups for mobile learning?
4	Why do students use Facebook?
5	Why do students use smartphone?
6	What are the pros and cons of using Facebook for mobile learning?

Table 6.4 Research question 3 - 6

Research finding	Research question	Qualitative research findings
1	6	Focus group students mentioned various advantages of using the Facebook private study group for mobile learning. These advantages are categorized into (i) communication, (ii) interaction and collaboration, (iii) access to course materials, (iv) internet search for information, and (v) convenience and ease of use.
2	6	Focus group students mentioned their concerns about using the Facebook private study group for mobile learning. These concerns are categorized into (i) the physical limitations of smartphones; (ii) social media for learning; (iii) distraction by smartphones in class and (iv) too many Facebook private study groups.
3	3	Focus group students mentioned what the factors were that influenced them to use the Facebook private study group for

		mobile learning. These factors are categorized into (a) habit; (b) performance expectancy; (b) effort expectancy; (d) hedonic motivation; (e) interactive learning; (f) device usability; (g) social presence and (h) subjective and social norms.
4	4	In the focus group interviews, students explained the reasons behind using Facebook. They are (1) Friends, (2) Content sharing, (3) Source of news, (4) Facebook groups, (5) Entertainment, and (6) Simplified registration.
5	5	In the focus group interviews, students explained the reasons behind using Facebook. They are (1) functions, (2) portability, (3) multimedia support, (4) personal assistant, and (5) entertainment.

Table 6.5 Summary of qualitative data analysis results

7 Discussion

This chapter discusses the research findings and how they relate to the research aims, objectives, and questions. The research findings are compared with the findings of past literature for validation. The discussion covers the implications of the research models and constructs to both pedagogical strategies designed by educators and educational strategies in higher education in Hong Kong.

7.1 Research question 1

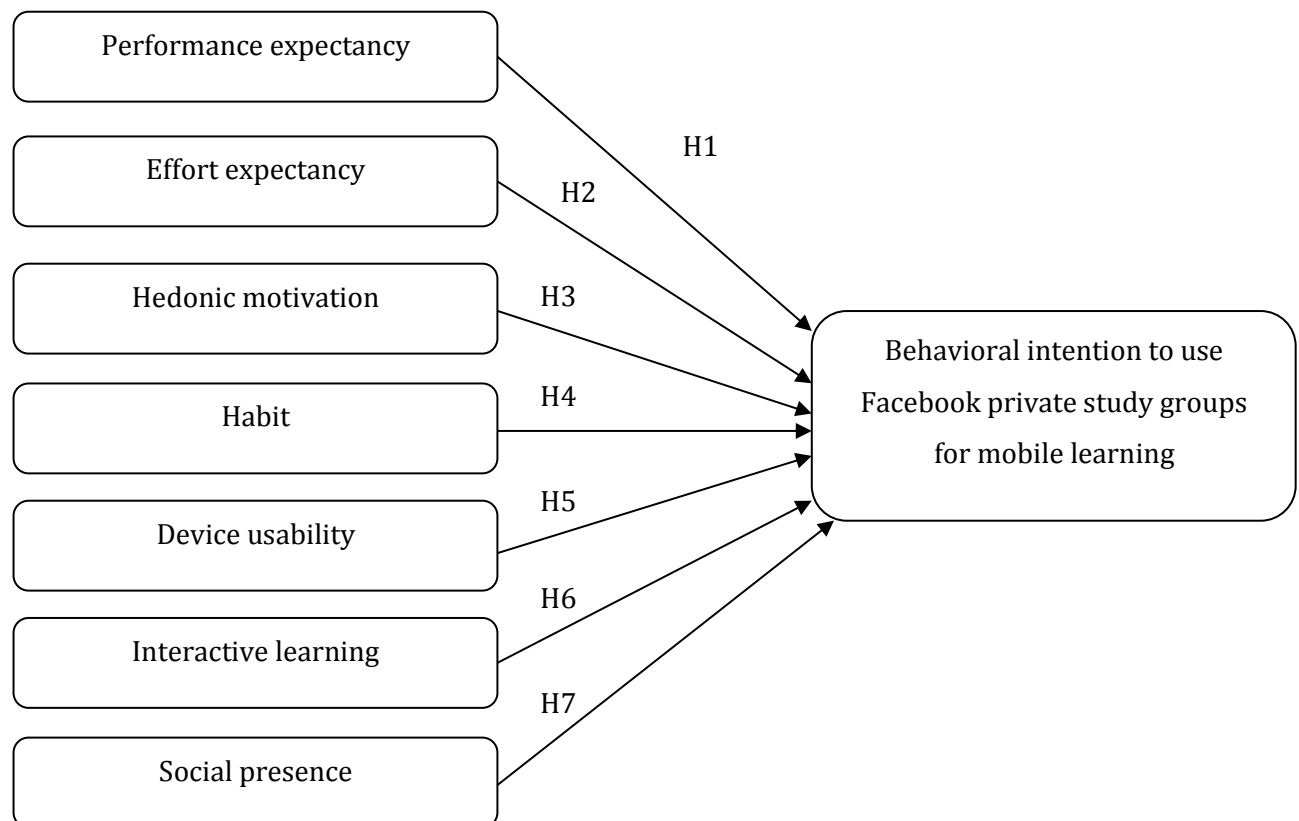
The research question 1 in this research was “What are the determinants influencing students’ adoption of Facebook private study groups for mobile learning?” This section addressed research question 1 as follows.

As this research aimed to investigate the determinants influencing the students’ adoption of Facebook private study groups for mobile learning. After literature review in Chapter 2, seven critical constructs were identified, namely, performance expectancy, effort expectancy, habit, hedonic motivation, social presence, interactive learning and device usability. Literature synthesis was conducted in Chapter 3 and seven hypotheses were generated in order to test if these constructs were associated with the behavioral intention to use Facebook private study groups for mobile learning. Figure 7.1 shows the theoretical framework for this mobile learning study.

- H1: Performance expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
- H2: Effort expectancy will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
- H3: Hedonic motivation will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
- H4: Habit will be positively associated with actual use of Facebook private groups for mobile learning.
- H5: Device usability will be positively associated with actual use of Facebook private groups for mobile learning.

- H6: Interactive learning will be positively associated with behavioral intention to use Facebook private groups for mobile learning.
- H7: Social presence will be positively associated with behavioral intention to use Facebook private groups for mobile learning.

Figure 7.1 shows the theoretical framework for this mobile learning study.



This research adopted mixed research methods, i.e. quantitative and qualitative research. Quantitative research belongs to the positivist research paradigm which is mainly related to the management of data collection and analysis. One obvious advantage of quantitative research is the high level of objectivity. This means the researcher does not need to be concerned with why people respond. The collected data will nonetheless disclose the association or relationship between factors. By contrast, qualitative research belongs to the phenomenological paradigm which provides the researcher with a clearer and more detailed understanding of the research subject. Therefore, qualitative research can help provide triangulation of the quantitative research results and explore the issues that are not addressed in the quantitative research (Creswell, 2013). According to Denzin (1978: 291), triangulation is defined

as "the combination of methodologies in the study of the same phenomenon." The purpose of triangulation through the mixed method is to provide multiple points of view for better accuracy (Jick, 1979). However, the quality of the quantitative research depends on a number of elements, including (1) literature review; (2) identification of constructs; (3) assumption of research; (4) survey instruments; and (5) attitude of respondents. The findings of quantitative research will be seriously affected if any of these elements cannot be handled properly. Thus, in this research, the literature was critically reviewed so that important constructs were identified. Furthermore, the questionnaire was developed based on the survey instruments of past literature so that the questions were appropriate to represent the construct. In order to ensure the attitude of respondents was voluntary and was not affected by the teacher, who was the researcher as well, the invitation letter and informed consent were sent to them after they received their course grades. Among 150 invitations, there were 123 participants who voluntarily joined the online survey. The response rate was 82%. The 123 valid online survey responses were analyzed using SPSS.

In the research, the quantitative research findings showed that the seven constructs had significant positive associations with behavioral intention to use Facebook private study groups for mobile learning. Table 7.1 shows the summary of the quantitative data analysis results.

Table 7.1: Summary of quantitative data analysis results

Hypothesis	Relationship with Behavioral Intention (BI)	Hypothesis	Ranking based on coefficients β	Results
H1	Performance Expectancy	Positive & significant	7th	Supported
H2	Effort Expectancy	Positive & significant	5th	Supported
H3	Hedonic Motivation	Positive & significant	1st	Supported
H4	Habit	Positive & significant	4th	Supported
H5	Social Presence	Positive & significant	2nd	Supported
H6	Device Usability	Positive & significant	6th	Supported
H7	Interactive Learning	Positive & significant	3rd	Supported

7.1.1 Hedonic Motivation

Hedonic motivation has a positive association with behavioral intention. The results are consistent with UTAUT2 that Hedonic motivation is a predictor of behavioral intention. It also corroborates the findings reported by other scholars (Huang, Lin & Chuang, 2007; Cheon et al., 2012; Bere, 2014 April; Lowry et al., 2012; Tarhini, Mohammed & Maqableh, 2016, El-Masri & Tarhini, 2017). Among the seven constructs, Hedonic motivation has the strongest association with behavioral intention. Thus, an individual with high hedonic motivation is more likely to adopt Facebook private study group for mobile learning than one with low hedonic motivation. According to Ahtola (1985), hedonic motivation is about the influence of people's pleasure and pain and the subsequent desire to achieve a goal or move away from risk. The results indicate that the majority of students feel pleasure about using their smartphone to participate in Facebook study group learning activities. Their behavioral intention to use a Facebook study group for mobile learning is supported by the arguments of Schacter, Gilbert & Wegner (2011) that pleasure-seeking is one of the fundamental element of all motives and Waterman et al., (2008) that intrinsic motivation is a function of hedonic enjoyment and personal expressiveness. The results are consistent with students' frequent access to social networking sites as reported by Pearson's (2015) student mobile device survey and the Pew Research Center's survey into mobile phones, because a high percentage of usage implies their high intrinsic motivation towards using social networking sites and smartphones. The results of qualitative research are in alignment with the quantitative findings because students explained that participating in Facebook class activities using smartphones is fun and entertaining. The research findings have practical implications for educators. When an educator is planning for learning activities, the activities should contain elements to promote pleasure, enjoyment and expressiveness (Waterman, 2005; Powell & Andresen, 1985). For instance, (a) mobile individual or group competition-based learning activities (Sung & Hwang, 2013); and (b) individual idea contribution or group collaborative knowledge sharing activities, can be considered to motivate students intrinsically (Faraj, Jarvenpaa & Majchrzak, 2011).

7.1.2 Social Presence

The research findings revealed that social presence had a significant positive association with behavioral intention to use a Facebook private study group for mobile learning. The results are consistent with the research findings of Cheung et al. (2011), Shin & Kim (2008), Shen (2012) that social presence is a predictor of behavioral intention to use Facebook. The results also corroborate the findings reported by other scholars (Biocca, Harms & Burgoon, 2003; Shin et al., 2011; Smith & Sivo, 2012; Mtebe & Raisamo, 2014). It should be noted, however, that in terms of the magnitude of coefficient β , social presence ranked 2nd among the constructs, which implies the relative importance of social presence to behavioral intention. Facebook is a social networking site where social interaction and connection are the main purposes. However, there are researchers expressing concerns about the benefits of computer-mediated communication because it lacks face-to-face interaction and facial expression (Richardson & Swan, 2003). These concerns might be explained by the demographics of 'Millennial students' who prefer to share their information, photos and videos online. They have adapted to connect and communicate with their friends or classmates over the internet (Prensky, 2001; Traxler, 2007). In the case of a Facebook private study group, a community is formed where the sense of community is developed along with the group events or activities. In contrast to typical IT usage, the student Facebook usage experience depends on others. The phenomenon was consistent with the findings of Nadkarni & Hofmann (2012). In the Facebook research of Nadkarni & Hofmann (2012), people use Facebook due to various kinds of needs, i.e. (1) the need to belong and (2) the need for self-presentation. 'The need to belong' is a kind of intrinsic motive of an individual to affiliate with other people or friends so as to obtain social acceptance. 'The need for self-presentation' refers to the continuous impression management process. Sallnäs et al., (2000) explain that social presence represents how others are aware of the interaction in a communication. In other words, social presence grows rapidly when people have more communications and connections with friends. As 'Millennial students' have the personal traits of 'connectedness' and 'social interaction', and are easily affected by others in social networking sites, social presence is an important factor in joining Facebook private study groups for mobile learning (Cheung et al., 2011). The quantitative results are explained by the result of qualitative research that students prefer using Facebook

because of their friends, content sharing, source of news, and Facebook groups. The result findings have practical implications for educators. Educators should consider learning activities with more interaction and communication (Hillman, Willis & Gunawardena, 1994; Jonassen et al., 1995).

7.1.3 Interactive Learning

The quantitative data analysis showed that interactive learning has significant positive associations with behavioral intention to use Facebook private study groups for mobile learning. As consistent with prior literature that evidenced the significant relationship between interactive learning with technology, and behavioral intention to use the technology including blackboard systems and online learning communities (Liaw, 2008; Liaw & Huang, 2013; Liu et al., 2010), the emergence of interactive learning is partly due to the growing psychological and sociological importance of ‘play’ in education (Rieber, 1996) and the rapid proliferation of information and communication technologies (Revees & Revees, 1997). The findings also corroborate the results reported by other scholars (Chen, Kao & Sheu, 2003; Uden, 2006; Hoppe et al., 2003). The results show that interactive learning ranks 3rd in terms of the magnitude of coefficient β . This implies interactive learning plays a relatively important role in behavioral intention. The reason behind the increasing importance of interactive learning is due to the change in the mode of knowledge delivery. Unlike traditional unidirectional knowledge delivery by teachers, students learn through participating in learning activities. The mode of knowledge delivery has been changing since primary and secondary education (Scholastic, 2016). Another reason comes from the demographics of ‘Millennial’ students who rely heavily on internet and mobile technologies in their daily life. Learning interactively with the aid of technology is changing from an option into a must (Prensky, 2001; Traxler, 2007). There are researchers raising concerns about the teaching and learning effectiveness because (1) teachers are required to transform teaching materials into other formats for interactive learning; (2) lesson time is consumed by interactive learning; (3) some course knowledge is not suitable for interactive learning; (4) students are required to adopt the interactive learning system; and (5) the role of teacher becomes facilitator (Appana, 2008; Schmid, 2008; Frederick, 2017). On the other hand, prior studies have evidenced the advantages of interactive learning,

including improved critical thinking and reasoning (Johnson et al., 2000), improved teacher-student, student-student interaction, improved communication (Irwin et al., 2012; Gikas & Grant, 2013; Moghavvemi et al., 2017), learning engagement and satisfaction (Dabbagh & Kitsantas, 2012; Tess, 2013; Heflin, Shewmaker & Nguyen, 2017), learning outcomes (Liaw, 2008) and learning effectiveness (Holzinger et al., 2005; Tan & Liu, 2004; Fallahkhair et al., 2005). The quantitative results are further explained by the results of qualitative research that participating in Facebook class activities using smartphones could improve communication, interaction and learning engagement of students. The research findings have practical implications that educators should consider more interactive activities like using Facebook private study groups so that students can participate using their smartphone in class.

7.1.4 Habit

The quantitative results show that habit has a positive association with behavioral intention. This is consistent with UTAUT2 that habit is a predictor of behavioral intention. The results also corroborate the findings reported by other scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Yang, 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014). Besides, the results are in alignment with prior studies which have evidenced the significant relationship between habit and actual usage behavior in areas, including taobao.com (Pahnila et al., 2011), sporadic-use IT (Lankton et al., 2010), mobile payments (Dahlberg & Öörni, 2007), airline e-commerce (Escobar-Rodríguez & Carvajal-Trujillo, 2013) and learning management software (Raman & Don, 2013). Habit is a kind of subconscious or automatic behavior, in contrast to intention which belongs to conscious behavior (Limayem & Hirt, 2003). According to Triandis (1980), habits and intentions exhibit opposing influence on actual behavior as a function of time, i.e. the influence of intentions decreases over time whereas the effect of habits increases correspondingly. The results show that the degree of significance of habit ranks 4th to the behavioral intention. The results are supported by the Pew Research Center (2015) student survey report that students have used smartphones and social network sites frequently. A habit of using technologies for learning is important to the

learning habit as well. With an effective learning habit, students can manage their study through their smartphone, which, in turn, results in advantageous daily routine and time management (England.edu, 2016). Consistent findings were found by qualitative research that students used Facebook as part of their daily habits and routines. The research findings have practical implications that educators should consider incorporating Web 2.0 technologies or social networking sites which are part of students' daily habits so that they can adopt the technologies more easily and positively for mobile learning.

7.1.5 Effort Expectancy

Effort Expectancy has a positive association with behavioral intention. The quantitative research result is consistent with UTAUT2 that Effort Expectancy is a predictor of behavioral intention. The results also corroborate the findings reported by other scholars (Thomas, Singh & Gaffar, 2013; Yang, 2013; Cheon et al., 2012; Nassuora, 2012; El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Slade et al., 2013; Oechhslein et al., 2014; Mtebe & Raisamo, 2014). This implies students' perceptions about the convenience and ease of use of smartphones to access Facebook study groups for learning activities, that using this technology requires no effort. This is consistent with prior research that effort expectancy is a predictor of behavioral intention to use Facebook study groups for mobile learning (Venkatesh, Thong & Xu, 2012). The relatively weak association with behavioral intention is due to the contrasting perceptions of effort expectancy before and after using the technology because users have hands-on experience after use and their perceptions toward effort expectancy become well-formed (Venkatesh & Davis, 1996). The results imply that using Facebook and smartphones in learning activities does not create a barrier to student learning due to inadequate IT skills and knowledge. This implication is supported by Kennedy et al., (2008) who argue that students born between 1980 and 1996, are roughly regarded as generation Y, who are to 'digital natives'. They are learners who are different from their predecessors in processing information and thinking (Cobcroft et al., 2006). They are classified as 'millennial students' who concentrate on 'connectedness' and 'social interaction' (Oblinger, 2003; Oblinger, 2004). They have adopted and use technologies in their daily life where they have hand-on experiences and skills in using smartphones and

social networks like Facebook. The result is triangulated by the result of qualitative research that students have acquired hand-on Facebook usage experience and they need zero-effort to use a Facebook private study group for mobile learning. The research findings have practical implications that educators should (a) design a Facebook group interface, (b) represent URL file or video links using QR code (<https://www.the-qrcode-generator.com/>); (c) make use of Facebook functions like emotion buttons, so as to improve the user friendliness of systems or devices

7.1.6 Device Usability

Device Usability has a positive association with behavioral intention. The results also corroborate the findings reported by other scholars (Chen et al., 2003; Lonsdale et al., 2004; Kukulska-Hulme, 2009; Ismail, Johari & Idrus, 2010; Liu, Li & Carlsson, 2010; Shin et al., 2011; Mtebe & Raisamo, 2014). The usability of smartphones plays a critical role in student use behavior. Prior survey studies (Pearson, 2015) reveal that students prefer bigger smartphone screens for school work. Koole (2009) pointed out that the device usability should be considered while using smartphones for learning. Since a smartphone is a device designed for human use, this means smartphone usability is related to the context of human computer interaction (HCI). The quantitative research is supported by the findings of past literature that the higher degree of device usability, the more benefits to the users. This includes (1) improved learning effectiveness because of the mobility (Bruns, 2005a; 2005b) which encourages active learning (Ebner & Schiefner, 2008, January) and critical thinking (Maudsley & Strivens, 2000); (2) improved communication, interaction and entertainment (Herrington & Herrington, 2007) and collaboration over Web 2.0 platforms (Roschelle & Pea, 2002; Cruz-Flores & López-Morteo, 2008; Cheung & Vogel, 2013); (3) improved informal learning (Scanlon, Jones & Waycott, 2005; Clough et al., 2009; Kumar et al., 2010); (4) improved peer-to-peer learning and knowledge construction (Yao, 2010, August). However, the relatively weak association may be due to the limitations of smartphones, including (a) small screen size (Kim & Sundar, 2014), (b) inconvenient touch screen keyboard for typing (Page, 2013), (c) unstable internet connection (Pendell & Bowman, 2012), (d) learning platform not well-designed for smartphones (Gregory & Catlin, 2013). Device usability ranks 6th in the terms of significance in behavioral intention. This may be

due to the physical weaknesses of smartphones including small screens, small screen keyboards, limited memory, limited storage, short battery life, limited computation power (Siau et al., 2001). As the hardware limitations cannot be altered, Kukulska-Hulme (2005) point out that usable devices or systems must be efficient and effective to use, easy to learn and enjoyable. Duh et al., (2006) have the same arguments that user friendliness and usability can help design a smartphone which can reduce psychological and physiological stress, improve the learning curve, improve the user ability to operate the device and hence, improve the overall smartphone quality. The result is triangulated by the result of qualitative research that students agreed about the usability of smartphones in terms of empowerment by mobile applications, mobility, multimedia support, personal assistant and entertainment. Therefore, the practical implications for educators are that, given the functions available on Facebook, the activities should be arranged to fully utilize the Web 2.0 features. In order to reduce the impact of the small screen keyboard, students can write their answers on paper, take a photo and post it onto the group; (b) (where is (a)?) audio and video recordings are two powerful functions in smartphones that can be considered as an alternative to textual presentation or content sharing. This kind of arrangement can facilitate students to use Facebook private study groups for mobile learning and subsequently there would likely be a higher preference towards smartphone usability.

7.1.7 Performance Expectancy

Performance Expectancy has a positive association with behavioral intention. The quantitative research results are consistent with UTAUT2 that Performance Expectancy is a predictor of behavioral intention. The results also corroborate the findings reported by other scholars (El-Gayar & Moran, 2006; Kallaya, Prasong & Kittima, 2009; Liu, Li & Carlsson, 2010; Lowenthal, 2010; Cheon et al., 2012; Nassuora, 2012; Slade et al., 2013; Thomas, Singh & Gaffar, 2013; Oechslein et al., 2014; Mtebe & Raisamo, 2014). This implies using a smartphone to access Facebook study groups for learning activities can improve students' performance in learning (Venkatesh, Thong & Xu, 2012). The results are consistent with prior studies on UTAUT2 that performance expectancy is one of the major factors predicting technology acceptance and intention to use (Venkatesh, Thong & Xu, 2012; Oechslein,

2014; Raman & Don, 2013; Slade et al., 2013). The predicting ability of performance expectancy is supported by the findings of extensive past literature (Chiu & Wang, 2008; Lee et al., 2011; Paola et al., 2011, Bakar et al., 2013; Oshlyansky et al., 2007; Tan, 2013; Shin & Kim, 2008; Cheung & Vogel, 2013; Wang et al., 2009). According to UTAUT2, performance expectancy refers to the extent a consumer benefits from using certain technology to perform an activity. A consumer's expectation in the performance of using certain technology originates from the dissonance arousal (Stone and Cooper, 2001). From the mobile learning perspective, students are instructed to use mobile technology for the purpose of learning. No normative standard is set for mobile technology usage and dissonance arousal is minimized. This, in turn, results in positive expectancy and the likely effective performance in mobile technology usage. However, in contract to prior literature, Performance Expectancy has the weakest association among the seven constructs with behavioral intention. This may be due to the physical weaknesses of smartphones including small screens, small screen keyboards, limited memory, limited storage, short battery life, limited computation power (Siau et al., 2001). This argument is support by the student smartphone usage survey report of Pearson (2015) that a majority of students (87%) use notebooks whereas 64% of students use a smartphone and 40% students use a tablet for school work. Therefore, in order to improve student performance expectancy in the context of Facebook private study groups for mobile learning, the learning activities should be arranged to reduce the impact of the weaknesses of smartphones. For instance, (a) in order to reduce the problem of small screen keyboards, student can write their answers on paper, take a photo and post it onto the group; (b) audio and video recording are two powerful functions in smartphones that can be considered as an alternative to textual presentation or content sharing. The result is triangulated by the result of qualitative research that students agreed that using of Facebook private study groups for mobile learning could improve their learning effectiveness. Therefore, the practical implications for educators are that, social media and mobile learning should be considered in teaching and learning so as to improve student learning effectiveness.

7.2 Research question 2

The research question 2 in this research was “Are there any gender or age differences in adoption of Facebook private study groups for mobile learning?” This section addressed research question 2 as follows.

In this research, gender differences exist in effort expectancy whereas age differences exist in variables including performance expectancy, effort expectancy, hedonic motivation, device usability, interactive learning and social presence. The existence of age and gender difference in technology adoption is in alignment with the findings reported by other scholars (Morris & Venkatesh, 2000; Venkatesh et al., 2003; Baker, Al-Gahtani & Hubona, 2007; Wang, Wu, Wang, 2009; Terzis & Economides, 2011; Venkatesh et al., 2012; Salim, 2012; Bao et al., 2013; Tarhini, Hone & Liu, 2014).

In the research into gender differences in e-learning, Hoskins & Van Hooff (2005) argued that males are more inclined to use certain technology because males usually had more knowledge of using the technology than females. Their arguments were supported by the research findings of other scholars (Enoch & Soker, 2006; Ong & Lai, 2006). Ong & Lai (2006) further explained that females were strongly affected by ease of use and self-efficacy, whereas males were strongly affected by the perceived usefulness of an e-learning platform. Wang, Wu, Wang (2009) have evidenced gender differences in the adoption of mobile learning. The arguments and findings were supported by Terzis & Economides (2011). They argued that both males and females were likely to accept new learning technologies if the content was related to the course and the learning technologies were entertaining. Terzis & Economides (2011) further explained that their decisions were affected by the social environment where females were likely to adopt a new learning technology if it was easy to use. Therefore, it is reasonable to posit the existence of gender difference in mobile learning adoption and its moderating effect on effort expectancy (Venkatesh et al., 2003; Venkatesh et al., 2012).

In terms of age differences, Morris & Venkatesh (2000) argued that younger individuals are likely affected by their attitude towards using the technologies whereas older individuals are likely affected by the subjective norm and perceived behavioral

control, which resulted in inconsistent decisions on using the technologies. Their arguments were supported by Iqbal & Qureshi (2012) in the empirical study of mobile learning adoption. Besides, Wang, Wu, Wang (2009) evidenced that age differences did not exist in performance expectancy and perceived playfulness but differences existed in effort expectancy, social influence and self-management. Wang, Wu, Wang (2009) found that social influence was moderated by age and gender; that older males had a higher moderating effect than younger females. Females had a higher degree of self-management than males. Besides, Chung et al. (2010) evidenced the negative relationship between age and self-efficacy that older users had decreasing self-efficacy with new e-learning technologies. Despite the existence of age difference in mobile learning adoption in this study, the focus group interview responses of different age groups vary across different variables. It requires future investigation by including age as a variable in order to examine the correlations in mobile learning adoption.

7.3 Research question 3

The research question 3 in this research was “Is there any additional determinant that is important to student adoption of Facebook private study groups for mobile learning?” This section addressed research question 3 as follows.

In this research, subjective and social norms were not included as constructs of the theoretical framework. However, the findings of qualitative research showed that subjective and social norms affected the students’ intentions to use the Facebook private study group for mobile learning. The content analysis revealed that students preferred using Facebook because of (1) friends, (2) content sharing, (3) being a source of news and (4) Facebook groups. Furthermore, the subjective norm is defined as “the person’s perception that most people who are important to him think he should or should not perform the behavior in question” (Fishbein and Ajzen, 1975:302). As explained by Venkatesh (2003) in UTAUT, the subjective norm is a kind of social influence which is “the degree to which an individual perceives that important others believe that he or she should use the new system” (Venkatesh et al., 2003:451). According to Triandis (1980), the social norm is about what individuals think they

should do. The social norm is important to predict behavioral intention to use a technology (Lucas & Spitler, 1999). Studies into the adoption of Facebook, have found that it is influenced by a number of factors including the subjective norm, group norms, social identity, purposive value, self-discovery, interpersonal interconnectivity, social enhancement, entertainment value and social presence (Cheung, Chiu & Lee, 2011). In other words, content sharing including text, images or videos over Facebook can improve social identity, encourage social presence, maintain interpersonal interconnectivity, and create entertainment value.

7.4 Research question 4

The research question 4 in this research was “Why do students use Facebook?” This section addressed research question 4 as follows. In the focus group interviews, students explained the reasons behind using Facebook. They are (1) Friends, (2) Content sharing, (3) Source of news, (4) Facebook groups, (5) Entertainment, and (6) Simplified registration.

7.4.1 Friends

Friends were using Facebook and, therefore, the students joined Facebook so that they could easily contact their friends and know their recent news. The research result was consistent with the findings of Nadkarni & Hofmann (2012). In the Facebook research of Nadkarni & Hofmann (2012), people use Facebook due to various kinds of needs, i.e. (1) the need to belong and (2) the need for self-presentation. ‘The need to belong’ is a kind of intrinsic motive of an individual to affiliate with other people or friends so as to obtain social acceptance. Their arguments are supported by Korpijaakko (2015) that Facebook is a kind of online site embracing new media ecology and sociability where people participate in this new social media ecology because of the unique social media structure and people’s psychological predispositions.

7.4.2 Content sharing

Students described how Facebook ‘content sharing’ was an important feature to them. Students wanted to share texts, photos and videos and look at what others have posted. As explained by Nadkarni & Hofmann (2012), Facebook provided various functions to facilitate user interaction. This includes ‘wall’, ‘friend list’, ‘status’, ‘pokes’, ‘events’, ‘messages’, ‘chat’, ‘video’, ‘groups’ and ‘like’. These features allowed interaction and communication to occur with minimum user effort (Nadkarni & Hofmann, 2012) and encouraged the user to feel the joy while using these functions (Cheung, Chiu & Lee, 2011). From a technical perspective, these functions are further enhanced by Web 2.0 technologies, which feature interaction, communication and communication. Furthermore, once they have received an interesting or funny video, they can share with others and obtain the appreciation from others in form of a ‘LIKE’. This can be explained by the We-Intention model of Cheung, Chiu & Lee (2011). An individual’s intention to use Facebook is due to a number of factors including the subjective norm, group norms, social identity, purposive value, self-discovery, interpersonal interconnectivity, social enhancement, entertainment value and social presence. In other words, content sharing including text, image or video over Facebook can improve social identity, encourage social presence, maintain interpersonal interconnectivity, and create entertainment value.

7.4.3 Source of news

Some students relied on Facebook as their source of local news because they said many people posted the latest local news on Facebook for people to ‘like’. The research result can be explained by Rideout, Foehr, & Roberts (2010) that the M generation aged from 8 to 18 relies heavily on the internet where everything can be searched easily and more quickly online compared to newspapers and magazines no matter whether it is true or not. This implies ‘millennial students’ have these characteristics, (i) they want recognition over a social networking site, (ii) they care about what their friends think of them, and (iii) they want to do things for fun. These personal traits can be explained by subjective (Fishbein and Ajzen, 1975) and social norms (Triandis, 1980) and social influences (Venkatesh, 2003) that ‘millennial students’ decision whether to perform a behavior is a matter of their perception about what their friends think. For instance, they may believe their friends would like them

to join Facebook; they may believe their friends are pleased about their overseas trip sharing; they may believe that their friends ‘like’ the funny or breaking news they post. Furthermore, the term ‘get adapted to use Facebook everyday’ implies using Facebook is a habit, i.e. a daily routine (Nadkarni & Hofmann, 2012).

7.4.4 Facebook group

Some students described the Facebook ‘group’ as being an important feature to them. According to students, there were many different kinds of groups on Facebook, including games, hobbies, interests, etc. The research result was consistent with the findings of Nadkarni & Hofmann (2012). In the Facebook research of Nadkarni & Hofmann (2012), people use Facebook due to various kinds of needs, i.e. (1) the need to belong and (2) the need for self-presentation. Their arguments are supported by the We-Intention model of Cheung, Chiu & Lee (2011) that participating in a Facebook group is due to the subjective norm, group norms and social identity. It can help create purposive value, improve self-discovery, maintain interpersonal interconnectivity and create social enhancement. In addition to the origin of self-interest and knowledge acquisition, Valenzuela, Park & Kee (2009) explained that joining a Facebook group can increase an individual’s life satisfaction, civic engagement, social trust, and political participation. Their arguments are supported by information seeking behavior (Weiler, 2005) that when an individual perceives a need for information in a certain context, an information search is performed. According to Krikelas (1983), information seeking occurs when the perceived knowledge level of an individual is insufficient to tackle some problems. Therefore, students joining Facebook groups may be due to information seeking. However, when two students join the same Facebook group, they may have different motives or reasons. In general, the motives behind joining Facebook game, hobby or interest groups may be simply for fun. There are Facebook groups that provide benefits for users.

7.4.5 Entertainment

Some students described Facebook ‘entertainment’ as being an important feature to them. Although Facebook is a social networking site for online social interaction,

there are many game companies developing games over Facebook. The games on Facebook can be played alone or together. Therefore, Facebook users can play individually or co-operate with friends as team. Thus, they like Facebook because of the entertainment value, which can be explained by the We-Intention model of Cheung, Chiu & Lee (2011). An individual's intention to use Facebook is due to a number of factors including the subjective norm, group norms, social identity, purposive value, self-discovery, interpersonal interconnectivity, social enhancement, entertainment value and social presence. In other words, content sharing including text, images or videos over Facebook can improve social identity, encourage social presence, maintain interpersonal interconnectivity, and create entertainment value. Throughout game co-operation, Facebook users can satisfy (1) the need to belong and (2) the need for self-presentation (Nadkarni & Hofmann, 2012). The phenomenon can be explained by hedonic motivation (Venkatesh, Thong & Xu, 2012) that pleasure, joy, happiness, and fun can motivate students to use Facebook. Gilbert & Wegner (2011) explain that pleasure-seeking is one of the fundamental elements of all motives which happen in both animals and humans. Furthermore, Waterman et al., (2008) further explain intrinsic motivation is a function of hedonic enjoyment and personal expressiveness.

7.4.6 Simplified registration

Students described using Facebook because of its high penetration worldwide so that many websites embedded Facebook account registration and authentication directly. Students mentioned they would choose 'Facebook account registration' in order to skip time-consuming registration. The phenomenon can be explained by performance expectancy (Venkatesh, Thong & Xu, 2012) that Facebook can improve individual usage efficiency. It can be explained by effort expectancy (Venkatesh, Thong & Xu, 2012) that it is 'effort-free' for an individual to register and login to a certain website using their Facebook account directly. Furthermore, Urista, Dong & Day (2009) believed that the phenomenon was due to uses and gratifications. Many different websites allow Facebook account integration during registration, which, in turn, encourages the user to retain their Facebook account and spend even more time on Facebook. This is because Facebook can provide certain convenience during the

account registration. In other words, Facebook users feel satisfied after using Facebook.

7.4.7 Summary of the findings

The reasons for students to use Facebook are summarized as follows: (1) functions provided by Facebook, i.e. Web 2.0 technologies for communication, interaction and collaboration; (2) social influences (subjective norms, social norms and peer influences); (3) information seeking behavior; (4) performance expectancy; (5) effort expectancy; (6) habit.

7.5 Research question 5

The research question 5 in this research was “Why do students use Smartphone?” This section addressed research question 5 as follows. In the focus group interviews, students explained the reasons behind using Facebook. They are (1) functions, (2) portability, (3) multimedia support, (4) personal assistant, and (5) entertainment.

7.5.1 Functions

In the focus group interview, students explained the reasons behind using smartphones. First, students described the functions available as being comparable to a desktop computer or notebook; and the functions could be expanded through downloading more mobile applications. The phenomenon is consistent with the findings that a smartphone is limited by its hardware; it is empowered by mobile applications, i.e. augmented smartphone applications. This gives the smartphone functions that are comparable to a computer (Chun & Maniatis, 2009). Apple’s App Store has more than 400,000 applications and Google’s Android Market has more than 150,000 applications (Yan & Chen, 2011). In other words, a smartphone user can simply download mobile applications based on their needs and interests. There are many different types of mobile applications that have similar functions to a computer. In addition to traditional mobile applications, there are many manufacturers making goods as well as developing mobile applications so that they can control the goods or

hardware. An example of a smartphone application is ‘Smartphone based robotics’, which uses a smartphone as the control interface for inexpensive robots (Oros & Krichmar, 2013).

7.5.2 Multimedia Support

Students described the camera as being important because it could take photos and videos. Together with mobile sharing and internet connectivity, they could share photos and videos on social media including WhatsApp, WeChat, Line, Facebook, and Instagram. The phenomenon can be explained by the device usability, in that a smartphone has functions and features that meet users’ needs. According to Nayebi, Desharnais & Abran (2012, April), a device is said to have usability if (1) it can be used efficiently, (2) it can be learned easily and (3) it can satisfy user requirements and meet their expectations. From the human-computer interaction (HCI) perspective, usable device or system features are efficient and effective to use, easy to learn and enjoyable (Kukulska-Hulme, 2005).

7.5.3 Mobility

Third, students described smartphones as being mobile because it was handy, light-weight and has internet access. The phenomenon is supported by the statistic that the number of global mobile users has been more than the number of desktop computer users since 2014. The average time spent browsing on a smartphone in USA, UK, ITA and ESP is respectively 87, 66, 57 and 52 hours per month (Dave, 2017). This can be explained by the arguments of Bruns (2005a, 2005b) that the use of mobile technologies in learning empowers students to perform ‘user-led education’ which means they can create their own content and collaborate with others anywhere, anytime. Furthermore, the mobility feature together with other features, including wireless support, camera, accelerometer sensors, and powerful CPU etc., can be used by the healthcare industry, for instance, smartphone-based portable ultrasound imaging systems (Kim et al., 2013), ultrasound pulsed-wave Doppler devices for blood flow measurement (Huang et al., 2012), portable brain scanners for real-time neuroimaging system (Stopczynski et al., 2014), etc.

7.5.4 Personal assistant

A student mentioned that the role of a smartphone was like a personal assistant that (1) helped manage their daily matters and schedule; and (2) provided a lot of information. The phenomenon is explained by the empowerment of smartphones by mobile applications and subsequently the emergence of a new computing paradigm that smartphones can provide people with the necessary information via cloud computing and tracking people's daily lives and reminding people about important events and tasks (Fahim et al., 2012; Wang, Xiang & Fesenmaier, 2016).

7.5.5 Entertainment

Students mentioned that one of the important uses is entertainment. According to Schacter, Gilbert & Wegner (2011), pleasure-seeking is one of the fundamental elements of all motives. Their arguments support Waterman et al., (2008) that intrinsic motivation is a function of hedonic enjoyment and personal expressiveness. In other words, no matter whether it is a game, video or music, as long as a smartphone can create fun for users, they are willing to use it.

7.5.6 Summary of the findings

Based on the findings above, the reasons behind using smartphones are (1) the functions of smartphones, (2) the mobility of smartphones, (3) the multimedia support of smartphones, (4) the personal assistant role of smartphones and (5) the entertainment provided by smartphones.

7.6 Research question 6

The research question 6 in this research was “What are the advantages and concerns of using Facebook for mobile learning?” This section addressed research question 6 as follows.

7.6.1 Advantages of using Facebook for mobile learning

Focus group students mentioned various advantages of using the Facebook private study group for mobile learning. These advantages are categorized into (i) communication, (ii) interaction and collaboration, (iii) access to course materials, (iv) internet search for information, and (v) convenience and ease of use.

7.6.1.1 *Communication*

Within the Facebook private study group, students admitted that communication was an important factor in their learning. This was because communication occurred when (a) the teacher gave learning instructions to students; (b) students responded to the teacher in class activities; (c) the teacher gave feedback; (d) students discussed certain topics and (e) presentation. Students agreed that the various communications could encourage them to learn using their smartphone. Therefore, increased communication improved the teacher-student relationship and hence students' incentive to participate in Facebook private study group activities and learn using their smartphones. Focus group student responses on communication are supported by prior research that performance expectancy of UTAUT2 (Venkatesh, Thong & Xu, 2012) and social presence over CMC (Cheung et al., 2011; Shin & Kim, 2008; Shen, 2012). Furthermore, this is consistent with prior studies that immediacy is a critical determinant in predicting student learning, where task-type and people-type students are aware of the immediacy behavior of the teacher (Kearney et al., 1985) and subsequent student effective learning and perceptions of cognitive learning (Gorham, 1988). Furthermore, their responses provide evidence to support performance expectancy, because the communication facilitates students learning effectively; and (b) social presence, because high student immediacy can be reflected from their responses.

7.6.1.2 *Interaction and collaboration*

Students mentioned in the focus groups that the Facebook private study group using a smartphone did offer more opportunities for interaction and collaboration while working on group discussions, because each group member could use their smartphone to find relevant and useful information for knowledge sharing and contribution. In addition to group collaboration, students agreed about the benefit of class-wide collaboration where the whole class of students worked together on certain topics like SWOT analysis of SCS or promotion strategies for e-commerce. Students could see classmates looking at the same issue from different perspectives and learn from each other. With a smartphone, they didn't need to write anything on a whiteboard because everything - ideas and writing – was stored forever on the Facebook private study group. In addition, students mentioned that the teacher's feedback on the Facebook private study group was a kind of collaboration, because they could identify their weaknesses and improve in the next activity. The responses from student on interaction and collaboration are consistent with prior studies about the improvement of learning effectiveness and satisfaction in interactive learning (Blanchard & Rottenberg, 1990; Locatis, Letourneau & Banvard, 1989; Marsh & Kumar, 1992). Furthermore, their positive comments about collaboration reflect advantages about interactive learning, including improved critical thinking and reasoning (Johnson et al., 2000), improved teacher-student, student-student interaction, improved communication (Irwin et al., 2012; Gikas & Grant, 2013), learning engagement and satisfaction (Dabbagh & Kitsantas, 2012; Tess, 2013; Heflin, Shewmaker & Nguyen, 2017), learning outcomes (Liaw, 2008) and learning effectiveness (Holzinger et al., 2005; Tan & Liu, 2004; Fallahkhair et al., 2005). Furthermore, their responses provide evidence for the triangulation of the quantitative research findings because of their positive responses on the collaboration activities and their learning motivation and engagement and enjoyment as reflected by their feedback.

7.6.1.3 Search for internet information

Most of the focus group students described their reliance on the internet to search for information via a search engine. Students mentioned that the information available from the internet was far more than a textbook could provide. Furthermore, they

agreed that the information available from the internet was up-to-date. Their reliance on smartphones made them spend less time using a desktop computer or notebook. Students mentioned that it was inconvenient for them to go home or to a computer laboratory to find a computer for studying except when typing reports or preparing PowerPoint presentations. Some of them further mentioned that smartphones had various applications to support reading course materials in different media, including a pdf reader, office document reader, audio and video players. Moreover, students mentioned the 'zero-effort' involved while accessing course materials from the Facebook private study group via their smartphone. This is supported by the effort expectancy of UTAUT2 (Venkatesh, Thong & Xu, 2012). However, it should be noted that students' positive responses about 'access to course materials' using their smartphone are counter to the usability issues of smartphones including small screen size, various input methods, various communication methods and single task focus (Gong & Tarasewich, 2004; Kukulska-Hulme, 2005). The inconsistency does not mean that either party is correct or wrong, because the focus group students were interviewed in 2016 where the computation power of smartphones was far more powerful than researchers expected in the past. Furthermore, their responses provide evidence to support effort expectancy because it is effort-free to use a smartphone to access course materials from the Facebook private study group and (b) device usability, in that the smartphone is powerful enough to access course materials in different media .

7.6.1.4 Search for internet information

Most of the focus group students described their reliance on the internet to search for information via a search engine. Students mentioned that the information available from the internet was far more than a textbook could provide. Furthermore, they agreed that the information available from the internet was up-to-date. As Facebook is an online platform, students could simply share the information they found on the Facebook study group for learning activities. Furthermore, students agreed that searching for information on the internet could provide creative and innovative ideas in the form of texts, photos and videos. Furthermore, students pointed out that many websites provide Facebook 'share' and 'follow' buttons that allowed them to share the

information and continue to learn easily. This is supported by the effort expectancy of UTAUT2 (Venkatesh, Thong & Xu, 2012). Furthermore, student responses are supported by the student survey reports of Pearson (2015) and Pew Research Center (2015) that ‘millennial students’ are engaged in ‘connectedness’ and ‘social interaction’ (Oblinger, 2003; 2004). Their responses have opposed Siau et al.’s (2001) arguments about the limitation of smartphones because smartphone manufacturers are continuously developing new models with features eliminating those weaknesses, for instance, longer life battery provided by the manufacturer or an extra battery supplied by students. In the case of slow and unstable internet connectivity (Gyamfi & Gyaase, 2015), most of the students have subscribed to high speed 4G LTE data services so that the connectivity problem is minimized. Furthermore, their responses provide evidence to support device usability and effort expectancy because of the copy-cut-paste and share features of smartphones and Facebook private study groups.

7.6.1.5 Convenience and ease of use

Students in the focus group interviews described the Facebook private study group for mobile learning as being convenient in two ways. Firstly, they commented that they already have a smartphone with Facebook applications installed. This meant they didn’t need to buy or rent a mobile device for study and they didn’t need to install new applications. Secondly, students said that they didn’t need to learn a new mobile application for the purpose of mobile learning. Furthermore, students admitted that smartphones and Facebook were designed so that they are very convenient for daily use. Compared with learning the management system, MOODLE, students preferred using the Facebook private study group features instead. As mentioned by students, MOODLE did not have a mobile application but a website that supported smartphone small screens, i.e. a responsive website. The performance of a web app was slower than an installed mobile app. Furthermore, students agreed about the Facebook design that enabled communication, interaction, collaboration, and information sharing. Referring to previous sections, students described the smartphone as being an excellent companion in their daily life because everything was on this internet ready handheld device which allowed them to manage their studying regardless of space and time. This is supported by the effort expectancy of UTAUT2 (Venkatesh, Thong &

Xu, 2012) and device usability (Abran et al., 2003). As reported by Pew Research Center (2015), students spend a lot of time on smartphones and the corresponding social interaction, which, in turn, is in aligned with the responses of students that smartphone and social network site usage are a daily habit. Furthermore, their responses provide evidence to support habit and effort expectancy because of their daily usage.

7.6.1.6 *Summary of findings*

Based on the findings, the advantages of using the Facebook private study group include (1) better communication, (2) improved interaction and collaboration, (3) access to course materials, (4) Search for internet information, and convenience and ease of use.

7.6.2 *Concerns about using Facebook for mobile learning*

Focus group students mentioned their concerns about using the Facebook private study group for mobile learning. These concerns are categorized into (i) the physical limitations of smartphones; (ii) social media for learning; (iii) distraction by smartphones in class and (iv) too many Facebook private study groups.

7.6.2.1 *Physical limitations of smartphones*

Even though most of the students in the focus group interviews expressed positive feedback about using the Facebook private study group for mobile learning, there were some students who showed their concerns about the physical limitations of smartphones. They pointed out the main limitation was the small screen size even if it was a 5.5” - 6” smartphone, because they needed to keep zooming in and out on the document or photos. Furthermore, the small virtual keyboard of the smartphone was another barrier to mobile learning using a Facebook private study group because it was inconvenient if they needed to type lengthy answers to post on the wall of the Facebook private study group. Therefore, their concerns support those expressed by Siau et al. (2001) on the limitation of smartphones. Their concerns have implications for educators that Facebook private study group activities should be more flexible and

user-friendly by using the classroom projector so that some of the learning activities' information can be projected onto the dropdown screen. The learning activities should be arranged so that students do not need to keep looking at their smartphones for a long time. In terms of writing with a small keyboard, educators should consider instructing students to write their ideas on paper, take photo(s) and post them on the Facebook private study group. From a management perspective, the school should allocate more resources to IT equipment, for instance, 10.1" tablets should be provided in the classroom as basic optional facilities. The cost of these optional tablets is far less than the cost of setting up a computer laboratory. 10.1" tablets can overcome the small screen size of smartphones and their small virtual keyboards.

7.6.2.2 Social media for learning

In the focus group interviews, a few students disagreed with the use of social media for learning because they said the purpose of a social networking site, for instance, Facebook, was mainly for social communication, interaction and sharing rather than offering educational tools like assignment submission, tests/quizzes, that were provided by MOODLE (Manca & Ranieri, 2013). Furthermore, students were easily distracted by the posts of their friends and messages received. Students mentioned that teachers could post feedback on their work posted on the group but, because of privacy, teachers could not give any marks on Facebook. Teachers needed to add an assignment on MOODLE representing the learning activity on Facebook (Mazer, Murphy & Simonds, 2007; Yunus & Salehi, 2012). Another problem with Facebook is the distraction from learning while using Facebook, for instance, messages from friends, posts by friends, online games etc. (Fewkes & McCabe, 2012). Fewkes & McCabe (2012) evidenced from the research into Facebook that many high school students used Facebook for educational purposes and teachers began to use social media as an informal teaching tool, but Facebook was a social networking platform where the functions might distract students from learning. Despite their disagreements, they said that they could not ignore the user-friendly interface of Facebook and the convenience of smartphones.

7.6.2.3 *Summary of findings*

Based on the findings above, the concerns of using a Facebook private study group for mobile learning are (1) Physical limitations, (2) Role of social media, (3) Distraction by smartphone.

8 Conclusion and Recommendation

This chapter concludes and summarizes this research study. There are four main sections in this chapter, (1) conclusion, (2) contribution to theory, (3) contribution to practice, and (4) recommendation. Then, research and future research opportunities are discussed.

8.1 Conclusion

This research originated from the educational potential of Facebook for mobile learning due to students' engagement with social media and smartphone. It becomes an issue of facilitating student learning and improving learning engagement by mobile learning (Olivier, 2011). Therefore, this research focused on investigating the research question, "What are the determinants influencing students' adoption of Facebook private study groups within higher education in Hong Kong?", and identified seven critical factors based on past literature. A Facebook mobile learning theoretical framework was established, interrelating seven independent variables, namely, performance expectancy, effort expectancy, hedonic motivation, habit, social presence, interactive learning and device usability; and the dependent variable, behavioral intention to use a Facebook private study group for mobile learning. This research adopted the pragmatism research paradigm and used the mixed method of research, i.e. the quantitative and qualitative research approach. Quantitative research was used to examine the causal relationship among variables scientifically and objectively. Qualitative research was used to triangulate the quantitative findings and explore new factors. This research carried out a case study in the SCS, where survey data and focus group interview data were collected respectively for quantitative and qualitative data analysis. The quantitative research findings have confirmed the causal relationships between the seven independent variables and dependent variable. This means students' adoption of Facebook private study groups for mobile learning could be predicted by performance expectancy, effort expectancy, hedonic motivation, habit, social presence, interactive learning and device usability. The causal relationships were validated by qualitative research findings. Furthermore, qualitative research findings revealed that 'subjective and social norms' affected students' adoption of Facebook private groups for mobile learning. Above all, it is pertinent to (1) understand that there are seven

factors influencing the adoption of Facebook private study group for mobile learning; and (2) understand the contributions of this research to theory and practice.

8.2 Contribution to theory

The findings of this research have contributions to practitioners and researchers who are interested the research findings of this study or the research area. There are three major areas of theory contributions, (1) confirmed relationship in mobile learning adoption, (2) subjective and social norms, and (3) adapting and extending the model to other contexts.

8.2.1 Confirmed relationships in mobile learning adoption

The theoretical research framework was tested quantitatively and validated qualitatively. The quantitative results confirmed the significant positive associations with behavioral intention for mobile learning adoption and the seven constructs, namely, performance expectancy, effort expectancy, habit, hedonic motivation, social presence, interactive learning and device usability. The research findings corroborated the research results of past literature (Cheung et al., 2011; Shin & Kim, 2008; Shen, 2012; Liaw, 2008; Liaw & Huang, 2013; Liu et al., 2010; Pahnla et al., 2011; Lankton et al., 2010; Dahlberg & Öörni, 2007; Escobar-Rodríguez & Carvajal-Trujillo, 2013; Raman & Don, 2013; Venkatesh, Thong & Xu, 2012). Therefore, this research study has added to the body of knowledge by confirming the significant positive associations of these seven factors to students' adoption of Facebook private study groups for mobile learning. Among the seven factors, this research study evidences that 'Hedonic Motivation' has the strongest influence on mobile learning adoption. This strongest influence could be explained by the arguments of Waterman, (2005) and Faraj, Jarvenpaa & Majchrzak (2011) that learning activities should promote pleasure, enjoyment and expressiveness which could motivate students intrinsically. In addition, the use of Facebook private study groups into pedagogies is complementary to mobile learning. This is because Facebook is a social network site built using Web 2.0 technologies which feature collaboration, participation and distribution (Greenhow et al., 2009). Furthermore, statistics show that 73% of students aged between 12 – 17, use social networking sites (Lenhart et al., 2010), which implies the high popularity of social media among 'Millennial students'. Thus,

educators making use of social media as part of formal learning could increase student engagement (Bull et al., 2008). This would provide a useful reference for other researchers and practitioners who are interested in the research study of Facebook private study groups for mobile learning or mobile learning adoption.

8.2.2 Subjective and social norms

The qualitative research findings affirm the significant positive associations of the seven factors to behavioral intention and revealed from participants' feedback that 'subjective and social norms' would affect their intention to adopt Facebook private study groups for mobile learning. Subjective and social norms are not new factors, but they are nonetheless factors included in past behavioral theories, for instance, The Theory of Reasoned Action (TRA), The Theory of Planned Behavior (TPB), The UTAUT and combined TAM-TPB. The subjective norm is a kind of social influence in The Unified Theory of Acceptance and Use of Technology and refers to "the degree to which an individual perceives that important others believe that he or she should use the new system" (Venkatesh et al., 2003:451) whereas the social norm is about what individuals think they should do (Triandis, 1980). Lucas & Spitler (1999), based on their research findings, posited that the social norm was important to predict behavioral intention to use a technology. Moreover, the importance of subjective norms to an individual's behavioral intention is supported by past research studies (Cheung and Vogel, 2013; Sánchez & Hueros, 2010; Lou, Luo & Strong, 2000). However, in the study of collaborative learning technologies, Cheung and Vogel (2013) argued that subjective norms were particularly important because of peer influences. However, subjective norms or peer influences have a moderating effect on the relationship between attitude and behavioral intention. Therefore, 'subjective and social norms' as revealed from the qualitative research have implied the possible existence of interrelationships among the factors. This would provide a useful reference for other researchers and practitioners who are interested in the research study of Facebook private study groups for mobile learning or mobile learning adoption.

8.2.3 Adapting and extending the model to other contexts

The theoretical framework developed in this research aims to explain the factors influencing students' adoption of Facebook private study groups for mobile learning. The framework was examined by a case study of SCS, CUHK, and tested quantitatively using survey data. This research methodology allows the theoretical framework to be replicated in other contexts for further empirical testing, and generalization if the sample size is large enough (Creswell, 2013; Johnson and Onwuegbuzie, 2004). Therefore, the theoretical framework of this research study allows other researchers or practitioners, who are interested in the research study into mobile learning adoption, to apply and test in other contexts, notably, other universities in Hong Kong or universities in other countries. This theoretical research framework provides the flexibility of empirically studying the adoption of Web 2.0 technologies for mobile learning. Thus, the theoretical framework of this research could provide flexibility to other researchers or practitioners to extend by adding other constructs that are relevant to their research contexts, for instance, cultural, age, gender, e-quality, trust and satisfaction (Wang, Wu & Wang, 2009; Cody-Allen & Kishore, 2006).

8.3 Contribution to practice

The findings of this research have contributions to the management and teachers of the university. The contribution to the management of the university is explained in the section 'Business strategies of mobile learning on student retention'. The contribution to teachers is explained in the section 'The use of mobile learning in teaching and learning' whereas 'Implications based on student demographics' are discussed in the following sections.

8.3.1 Business strategies of mobile learning

The Education Bureau higher education accreditation policy aims at achieving 60% of teenagers in Hong Kong receiving higher education (EDB, 2006). The number of self-financed colleges and private universities is increasing continuously. Besides, the Census and Statistics Department (2016) reports the total fertility rate for the past decade ranges from 0.748% – 1.148%. This results in a low birth rate and a decrease in the young population in Hong Kong. Apart from the increase in aging in the

population, the decrease in the young population has a significant impact on primary and secondary education in Hong Kong because there are insufficient students studying at primary and secondary schools. The low birth rate has resulted in 16 Hong Kong secondary schools facing the risk of closure (SCMP, 2015). This is because those schools are subsidized by the HKSAR government. Similar subsidization policies are used in higher education in Hong Kong. There are eight universities funded by The University Grants Committee (UGC), namely, the City University of Hong Kong, Hong Kong Baptist University, Lingnan University, The Chinese University of Hong Kong, The Education University of Hong Kong, The Hong Kong Polytechnic University, The Hong Kong University of Science and Technology and The University of Hong Kong. One of the main functions of the UGC is to allocate funding to these universities. However, one of the main criteria for assessing the amount of funding is related to the number of students studying at the university (UGC, 2017). Therefore, the decrease in the number of students due to low birth rates results in a decrease in the university funding. As a result, public universities receive decreasing government subvention and face increasing operating costs. They try to increase their income by offering various private courses which, in turn, compete with the private universities and self-financing colleges, making the higher education market in Hong Kong more competitive than ever (So, 2014; Yip et al. 2001; Mok, 2003, Mok, 2000; Mok 2005).

Higher education institutions should consider seriously their survival and sustainability in the highly competitive higher education sector (Chatterton & Goddard, 2000). Being equipped with proper information technology may create sustainable competitive advantages to higher education institutions nowadays (Porter, 1990; Green & Gilbert, 1995; Graham, 2006; Boulos, Maramba & Wheeler, 2006). There has been a rapid advancement in information technology in the past few decades. Changing technologies have had a significant impact on people's daily lives. Obvious paradigm changes include (1) personal computers in the 1970s, (2) the internet in the 1990s, and (3) smartphones in the 2000s. In the past, people acquired knowledge from books which were available in a library. Computers digitize the books. The internet shares information and knowledge publicly so that everyone can freely search, learn and contribute. Smartphones integrate and consolidate most of the computer functions into a handy device with mobility features supporting wireless

network connection (Rogers, 2000). The daily lives of people have changed significantly including shopping, banking, reservations, communication, interaction and learning (Falaki et al., 2010). New generations of university students prefer communication via their smartphone. They prefer instant messaging instead of email (Margaryan, Littlejohn & Vojt, 2011; Andersen, 2007). Thus, it is necessary for universities to keep track of the latest developments in information technology and uncover the educational potential of this technology. There is increasing evidence that blended learning using technology could improve the learning experience of students (Garrison & Kanuka, 2004). It is evidenced that the factors about facilities have a significant impact on a student's choice of university (Price et al., 2003). A successful example is the School of Professional Education and Executive Development (SPEED), The Hong Kong Polytechnic University. In order to improve the student learning experience by mobile learning, SPEED has subscribed to the online polling service, PollEverywhere.com, for teachers and students so that teachers can design online quizzes as in-class activities and students can simply choose the correct answer on their smartphone. This kind of knowledge recap activity not only helps students reflect on what they have just learned, but also helps teachers evaluate their teaching effectiveness and students' learning progress (Wong, 2016). However, the problem is the cost incurred by the change, due to purchasing new learning facilities, upgrading classrooms, and hiring additional human resources (National Research Council, 1999). Therefore, in this techno-driven era, it is necessary for the management in universities to formulate techno-driven student-oriented initiatives for the benefit of students. Subsequently, better student enrolment might result because of improved student loyalty and retention (Price et al., 2003; Garrison & Kanuka, 2004).

8.3.2 The use of Facebook and mobile learning in teaching and learning

A smartphone provides the ideal platform for mobile learning because of its high degree of usability. Mobile learning has been increasingly studied by researchers over the past decade. Various benefits have been identified from mobile learning (Bruns, 2005a; 2005b; Chen, Kao & Sheu, 2003; Peng et al., 2009; Ebner & Schiefner, 2008, January; Maudsley & Strivens, 2000; Herrington & Herrington, 2007; Waycott & Kennedy, 2009; Roschelle & Pea, 2002; Cruz-Flores & López-Morteo, 2008; Cheung & Vogel, 2013; Scanlon, Jones & Waycott, 2005; Clough et al., 2009; Kumar et al.,

2010; Wang, Wu & Wang, 2009; Yao, 2010, August). However, successful mobile learning requires certain mobile applications as the learning platform. This can be achieved through (1) developing mobile learning applications, (2) running existing learning platforms on smartphones, (3) using existing mobile applications. This research attempts to investigate mobile learning using an existing mobile social media application, i.e. Facebook, a social networking site widely used by students in Hong Kong. Facebook, on the other hand, has been widely investigated by researchers as to its educational potential (Fewkes & McCabe, 2012; Madge et al., 2009; Mazer, Murphy, Simonds, 2007; Lam, 2012). Scholars have evidenced that the use of Facebook in teaching and learning can improve student learning motivation, promote effective learning, improve the classroom climate (Mazer, Murphy, Simonds, 2007), improve learning engagement, improve communication (Lam, 2012), and improve informal learning (Fewkes & McCabe, 2012). Furthermore, Facebook has features which are better than existing learning management systems, for instance, MOODLE, including instant messaging, notifications, photo and video support, etc. Thus, integrating Facebook can help compensate for the weaknesses of MOODLE.

Despite some researchers expressing concerns about the appropriateness of using social media in education, in terms of privacy and social media functions (O'Keeffe & Clarke-Pearson, 2011), the issues can be overcome with proper Facebook group settings (Lam, 2012). New technologies could help connect people and share knowledge (American Psychological Association, 2009). However, the benefits of learning using technology depend on the way the technology is used. Teachers should use technology to improve the classroom setting and promote knowledge instead of simply using technology as an information source. Furthermore, the use of technology, for instance, should encourage learning engagement instead of simply providing entertainment. As Facebook is always accessible using university computers for a new generation of students who have adapted to using it frequently, educators should not be skeptical or ignore the educational potential of social networking sites (Fewkes & McCabe, 2012).

The findings of this research have certain implications for teachers in practice. Firstly, in order to facilitate mobile learning, it is suggested the nature of mobile learning is entertaining and brings joy to students (Venkatesh, Thong & Xu, 2012). Secondly, the

platform for mobile learning should provide a communication channel for students and teachers so that their online social identities are improved (Nadkarni & Hofmann, 2012; Cheung, Chiu & Lee, 2011). Thirdly, learning activities using smartphones should be interactive so as to motivate students to participate and learn (Johnson et al., 2000; Irwin et al., 2012; Gikas & Grant, 2013; Moghavvemi et al., 2017). Fourthly, the mobile technology or applications chosen should be in alignment with students' daily habits so that they can adopt it easily and quickly (Limayem & Hirt, 2003). Finally, the mobile learning design should be aware of the limitations of smartphones including small screen, small keyboards, unstable wireless connection, short battery life, etc (Stockwell, 2007; Goth, Frohberg & Schwabe, 2006, November; Shudong & Higgins, 2005, November). Therefore, in order to facilitate student learning and improve the student learning experience using Facebook private groups for mobile learning, teachers should consider the various factors as stated in the theoretical framework so as to increase the likely acceptance of the technology.

8.3.3 Implications based on student demographics

People around the world are categorized into different generations. For instance, (a) generation X refers to the population born between 1960 and 1979, (b) generation Y (Millennials) refers to the population born between 1980 and 1999, and (c) generation Z refers to the population born between 2000 and 2019. Different generations bear different demographic characteristics, for instance, (a) generation X people are hard-working and received education from a traditional system, (b) generation Y people are more well-off and self-centered, and (c) generation Z people are young and receive education at different levels. Generation Y, called 'Millennials', are regarded as 'Digital natives', who are in the habit of using technology in their daily lives. Generation Z, is usually an only child and becomes even more well-off. The challenges facing universities are how to adjust existing education strategies in order to meet the learning needs of different generations. In the past, traditional teacher-oriented unidirectional pedagogical strategies were applied to generation X (McCrindle, 2016). However, the strategies have to be changed to become student-oriented and interactive so that a new generation of students can be motivated to learn. Another critical challenge is how universities can uncover the educational potential of popular technology to create a rich learning environment for 'Millennials' (Fewkes &

McCabe, 2012). Although this study has confirmed the factors influencing students' adoption of Facebook private study groups for mobile learning, further research is necessary to understand the demographics of the new generation of students, so that the theoretical research framework can be refined to improve the explanation of the adoption of Facebook private study groups for mobile learning. Ideally, the theoretical research framework could provide more insight for the management of the university so that they can make the appropriate decision and take the correct steps to provide the institutional support to improve student learning.

8.4 Recommendations

In this study, there are three main areas of recommendation for the management and teachers of colleges and universities, namely, (1) strategic planning in education, (2) student demographics and (3) Facebook private groups for mobile learning.

8.4.1 Strategic planning in higher education institutions

How does mobile learning contribute to the improvement of the student engagement in learning (Heflin, Shewmaker & Nguyen, 2017)? In this techno-driven era, the internet and mobile technology are increasingly playing an important role in any industry. Colleges and universities are no exception. It is necessary for the management of institutions to consider seriously the benefits and potential of integrating the latest information technology (IT). For instance, the rapid proliferation of mobile technology creates enormous educational opportunities for higher education which can (1) improve student learning engagement and efficiency; (2) improve lecturers' teaching; and (3) improve the institution's business operations, and create additional capacity for the institution. Therefore, mobile technology not only improves the overall efficiency of an institution, but also creates competitive advantages for the institution (Olivier, 2011). Though IT investment may create risk and place a financial burden on the university, this is not an excuse for ignoring an IT investment plan. A traditional management approach to running a university seems to be a safe plan, and yet the university does not have any sustainable competitive advantage over time. As a result, there is an increase in student drop out or withdrawal and a decrease in student graduation, which, in turn, decreases student loyalty and

retention, damaging the university's image and decreasing tuition revenue (Yorke & Longden, 2004; Hrabowski & Suess, 2010; Wankel, & Blessinger, 2013). Therefore, it is recommended that the management of a university should be more proactive by actively considering IT as part of its strategic planning. This can be achieved by hiring a Chief Information Officer (CIO) who is an IT expert with solid IT knowledge and experience. The CIO could provide the management with useful advice on IT strategic planning and integrating IT into university life, so that IT becomes one of the sustainable competitive advantages in the long run (Grover et al., 1993). And most importantly, a new generation of students could benefit from a learning environment that is fully supported and facilitated by IT and hence student retention would be improved and the likely success of the institution increased (Hrabowski & Suess, 2010).

8.4.2 The changing student demographic

The new generation of students, Generation Y, called 'Millennials', are regarded as 'Digital natives', who have adapted to using technology in their daily lives (McCrindle, 2016). The demographics and learning preferences of students change over generations. Traditional teacher-oriented unidirectional pedagogical strategies are not applicable to 'Millennial students'. With this in mind, a blended learning approach using technology is increasingly playing an important role in education (Fewkes & McAbe, 2012). It is recommended that universities and teachers should consider popular technology widely used by students and release the potential of this technology in teaching and learning so as to make effective use of it to improve the student learning experience. In this research, the use of a Facebook private study group for mobile learning would facilitate Millennials' learning by providing a rich, interactive and collaborative classroom setting (Boyle et al., 2003; Graham, 2006; Rovai & Jordan, 2004; Aspden & Helm, 2004; Allan, 2007; Evans, 2008; Hughes, 2007; Wu, Tennyson & Hsia, 2010; Lau, Lui & Bo, 2010; Tselios, Daskalakis & Papadopoulou, 2011; Cheung and Vogel, 2013; Herreid & Schiller, 2013; Shih, 2011; Lam, 2012; Cheung, 2013; Mayisela, 2013). Teachers should use technology to improve the classroom setting and promote knowledge instead of simply using technology as an information source. Furthermore, the use of technology, should, for

instance, encourage learning engagement instead of simply providing entertainment (Fewkes & McCabe, 2012).

8.4.3 Facebook private groups for mobile learning

Is mobile learning necessary for colleges and universities (Cheon, Crooks & Song, 2012)? The higher education industry in Hong Kong is increasingly competitive due to low birth rates and new local & overseas competitors. The decrease in student enrolment has a significant financial impact on universities. Meanwhile, the advancement in internet and mobile technologies has urged universities to employ and integrate the latest technologies in teaching and learning, to improve the student learning experience. Researchers have evidenced that some secondary schools in Canada support the use of social media, for instance Facebook, in the classroom setting because the student learning enhancement is congruent with the school vision, including fostering classroom communities, improved teacher-student communication, improved trust and connectedness of students (Fewkes & McCabe, 2012). Thus, using Facebook private study groups for mobile learning would be an option for teachers and universities. Scholars have evidenced that Facebook and mobile learning could improve student learning motivation and engagement (Lam, 2012; Lam & Ng, 2015; Cheung, Chiu, Lee, 2011; Madge et al., 2009; Roblyer et al., 2010). Therefore, it is recommended that teachers should consider the use of Facebook private study groups for mobile learning as a complementary activity in the classroom environment so that students can have more fun and learning benefits.

The results of this research have provided important insights about mobile learning in practice. Firstly, the research findings have showed significant associations of seven factors to the behavioral intention to use Facebook for mobile learning. Therefore, it is necessary to implement mobile learning by emphasizing these factors in order to improve students' learning experiences. Though most students have solid experience in using Facebook and smartphones, training in the use of Facebook and smartphones in learning can strengthen their experiences and hence their performance expectancy (Schwoerer et al., 2005). The effort expectancy can be improved with proper

instructions and mobile applications in the classroom. For example, (1) the teacher should prepare useful online resources, including websites or YouTube videos, in the form of QR codes so that students can simply visit the websites or watch the videos using a QR code reader mobile app (Louho, Kallioja & Oittinen, 2006); (2) the teacher should instruct students about the use of mobile applications in learning, for example, Google translate, Oxford dictionary, Graphic calculator, Image editor, ... etc. (Godwin-Jones, 2011). In terms of habit, though using smartphones and Facebook is part of the daily lives of most students, it is necessary for the teacher to guide them so that they can build up the habit of using smartphones and Facebook for learning. The teacher can prepare daily online short revision exercises so that students can do the revision every day and their results can be part of the continuous assessment for the course (Wang et al., 2009; Huang & Sun, 2010). For device usability, since smartphones have physical limitations, the teacher should not require students to type lengthy paragraphs or read too many articles using smartphones (Schaub, Deyhle & Weber, 2012). Instead, the teacher can consider instructing students to write down their opinions on paper, take a photo of it and post the photo online for sharing. If students are required to read an article using their smartphone, the teacher should make sure the online document supports 'zoom-in & zoom-out' and 'rotate screen – change orientation' modes, so that students feel more comfortable (Bevan, 2001). As an alternative to reading articles, the teacher may consider searching relevant learning videos on YouTube.com for students (Liu, 2010). For social presence, it is necessary for the teacher to establish a supportive online platform like a Facebook private group for students so that they can feel comfortable and safe to express their ideas and study collaboratively (Ally, 2004). In terms of interactive learning, the teacher should design online learning activities that can make use of Web 2.0 technologies, i.e. communication, interaction and collaboration, so that students can gain the greatest learning experiences (Brown, 2010; Rhih, 2011; Irwin et al., 2012). For hedonic motivation, the teacher should make sure the learning activities are entertaining, which does not mean funny games. Instead, the learning activities should be designed so that the level of difficulty matches the level of skill and knowledge of the students. This is because if the learning activities are too easy or difficult, they may feel bored. Therefore, appropriate learning activities can promote a positive learning environment so that students can create a sense of achievement and joy (Wang, Wu, Wang, 2009). Secondly, the research results indicate that there are age group differences in

performance expectancy, hedonic motivation, device usability, social presence and interactive learning. The teacher should consider adjusting the implementation of Facebook for mobile learning. Apart from strengthening the seven factors as illustrated above, the teacher should consider the differences between different age groups. In terms of social presence, the teacher should establish the environment, i.e. the Facebook private study group, and emphasize the learning platform so that the sense of online community can be built up and also the social presence (Ally, 2004). As mentioned above, the hedonic motivation of students can be improved by using relevant learning activities matching their knowledge and skills (Wang, Wu, Wang, 2009). The teacher should also be careful about the limitations of smartphones and instruct students to make use of their smartphones for searching for information on the internet, using mobile applications for learning, taking photos of their writing to share on the Facebook study group and watching learning videos so that the smartphone becomes a powerful learning device (Bevan, 2001). Past literature has evidenced that old users are skeptical about using new technology (Venkatesh & Morris, 2000; Liaw, 2002; Chung et al., 2010). It is therefore necessary for the teacher to provide proper training and assistance so that older students can manage mobile learning whereas younger students can accept mobile learning easily. Besides, inconsistent age group responses on performance expectancy and interactive learning may imply that different course arrangement for mobile learning should be made. The teacher should pay attention to the instructions given so that different cohorts of students can follow the learning instructions and participate in mobile learning activities successfully (Rowan, Correnti & Miller, 2002).

8.4.4 Guidelines for applying the research model in other universities or contexts

As mentioned in section 8.2.3, the research model could be adopted and tested empirically in other universities or contexts. However, there are some guidelines suggested for teachers who are interested in implementing Facebook for mobile learning. The pre-requisites include (1) Facebook is not prohibited by the government, (2) Facebook is widely adopted by university students, (3) Majority of students have smartphone where they can access Internet via school WIFI or their cellular service providers, (4) teachers are willing to use Facebook for teaching, and (5) normal

classroom rather than computer lab is preferred. In order to facilitate student learning using mobile Facebook, teachers should (1) plan carefully the in-class Facebook mobile learning activities in conjunction with class lecture and sample activities are shown in figure 5.6, (2) consider group activity instead of individual activity so as to encourage discussion, communication, interaction and brainstorming, (3) prepare course materials in digital formats, for instance, pdf, jpg, audio, video, etc. which are supported by smartphone, (4) require students to post their responses by means of taking photos or videos so as to minimize the impact due to smartphone physical limitations, and (5) be ready to reply student Facebook messages promptly anywhere anytime, especially, after-class. Besides, there were seven factors to consider so that students can adopt Facebook for mobile learning:

- (1) Performance expectancy: The Facebook learning activities should make good use of students' hand-on IT experience, for instance, they are required to find YouTube short video link explaining about Omni-channel marketing and post it on Facebook. Students prefer demonstrating their abilities of searching and sharing.
- (2) Effort expectancy: The Facebook learning activities should be simple and direct, for example, letting students like or dislike certain issue, or let student vote by choosing a choice so that they have little effort while participating.
- (3) Hedonic motivation: The Facebook learning activities should contain elements to promote pleasure, enjoyment and expressiveness. For instance, (a) mobile individual or group competition-based learning activities; and (b) individual idea contribution or group collaborative knowledge sharing activities, can be considered to motivate students intrinsically.
- (4) Habit: Teacher should make good use of Facebook notification by posting course related information frequently or daily, for example, quick quiz (using Facebook vote feature), post tiny learning tips, in order to develop student habits of visiting the group anywhere anytime.
- (5) Social presence: The Facebook learning activities should with more interaction and communication, for example, students are required to reply their idea to teacher's post.
- (6) Interactive learning: The learning activities should make use of the wall of the Facebook study group so that students can post the information they search from internet and get feedback from teachers.

- (7) Device usability: The Facebook learning activities should make good use of audio and video recording when students are required to post information. It is inconvenient for students to use virtual screen keyboard to type lengthy messages.

8.5 Research limitation and improvement

There are some limitations in this research. Firstly, the sample size is relatively small (N=123). Future research should increase the sample size to ensure a more representative sample. Furthermore, this limitation is one of the weaknesses in a scientific method of research, i.e. this research fails to handle a large number of variables with limited sample sizes (Gay, Mills & Airasian, 2011; Donaldson, 1996). Although this weakness was explained in previous chapters and compensated using qualitative research for triangulation and further exploration, the impact of this weakness could not be eliminated. Do these seven determinants contribute to the successful implementation of Facebook for mobile learning? In spite of the significant quantitative result, it is believed that there are other factors influencing students' adoption of Facebook for mobile learning, and the subsequent successful implementation (Wang, Wu & Wang, 2009). Secondly, this study was conducted by a case study of a course at SCS in Hong Kong. The research findings are not completely representative and cannot be generalized (Creswell, 2013; Johnson and Onwuegbuzie, 2004). The same cohort of students was invited to participate in the study where non-parametric tests revealed that there were significant gender and age group differences in variables. Thus, age and gender should be considered in future research. Therefore, the theoretical research framework can only be applied to the Hong Kong context that students are 'millennials' (Generation Y). Thirdly, this research investigated specifically the adoption of Facebook for mobile learning. Can mobile learning using Facebook be generalized across higher education globally (Bosch, 2009)? Although Facebook is a social networking site (SNS) widely used worldwide, there are countries which ban its use, for instance, North Korea, Iran, China, Cuba and Bangladesh. The reasons behind the prohibition include cultural conflicts, political issues and government decisions (Index, 2014). Therefore, the theoretical research framework of using Facebook private study groups for mobile learning cannot be applied to countries where Facebook is unavailable. Fourthly, this study makes use of

multiple linear regression to analyze the causal relationships between seven independent variables and one dependent variable because it is assumed there are no indirect relationships among variables and the linear relationships exist among variables (Maxwell, 1975).

However, these limitations can be improved. The small sample size limitation can be improved by increasing the sample size by inviting more teachers and students to participate in the research so that more constructs can be considered in the research model. The case study limitation can be improved by increasing the scope and depth of the research. This can be done by inviting students of different universities to participate in this research so that the research model can be more representative and generalized. The Facebook-prohibited limitation can be improved by inviting university students of different 'Facebook-allowed' countries to participate, so that the research model can be more representative and generalized. Multiple cases can improve the generalizability and replicability of the research model (Saunders, Lewis and Thornhill, 2012).

8.6 Future research opportunities

The research findings and limitations provide opportunities for future research.

8.6.1 The business opportunities of mobile learning

The success of a college or university is measured using student graduation and retention (Hrabowski & Suess, 2010). This can be achieved by facilitating their learning and improving their learning experience. It is believed the use of mobile technologies can improve an institution's business operation efficiency (Olivier, 2011) and have benefits on student learning, including learning flexibility (Bruns, 2005a; 2005b), critical thinking (Maudsley & Strivens, 2000), improved learning engagement (Chen, Kao & Sheu, 2003; Peng et al., 2009; Ebner & Schiefner, 2008, January), improved communication, interaction and collaboration (Roschelle & Pea, 2002; Cruz-Flores & López-Morteo, 2008; Cheung & Vogel, 2013). These benefits aim to improve student learning engagement and hence their learning success (Crosling, Heagney, & Thomas, 2009). However, there are limited studies investigating the business opportunities of mobile learning on student retention in higher education. By

addressing this research gap, this research provides future research opportunities for further investigation by researchers.

8.6.2 The adoption of Facebook for mobile learning in other contexts

An empirical study of this theoretical research framework can be tested across different universities and countries where Facebook is widely adopted by students, so that a comparison can be conducted. The application of this theoretical research framework to different contexts can provide more insights into the cultural differences, demographical differences and age differences in attitudes towards the adoption of Facebook private study groups for mobile learning. This provides the opportunity to compare whether the determinants have consistent explanatory powers on behavioral intention. For instance, ‘a comparison study of the Facebook mobile learning research framework between Asian countries, for example, Hong Kong, Japan, Taiwan, South Korea, and Singapore’.

8.6.3 Extension of theoretical research model

The content analysis of qualitative research has identified ‘subjective and social norms’. Therefore, this provides another research opportunity to investigate ‘subjective and social norms’ by extending the theoretical research framework so as to improve its explanatory power. As evidenced from the research by Wang, Wu & Wang (2009), behavioral intention toward mobile learning is affected by performance expectancy, effort expectancy, social influence, perceived playfulness and self-management of learning, moderated by gender and age differences. Therefore, an extension of the current Facebook mobile learning theoretical framework could be considered to include self-management of learning and the mediating factors (Wang, Wu & Wang, 2009; Cody-Allen & Kishore, 2006).

9 References

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10 Appendices

Appendix 1: Quantitative research - survey questionnaire

The term “mobile Facebook private study group” refers to "Facebook private study group using a smartphone".

1	2	3	4	5	6	7
Strongly Disagree (SD)	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly Agree (SA)

Questions		7 = Strongly agree 1 = Strongly disagree
1.	I find “mobile Facebook private study group” useful in my study.	1 2 3 4 5 6 7
2.	Using “mobile Facebook private study group” is important to me in study.	1 2 3 4 5 6 7
3.	Using “mobile Facebook study group” helps me accomplish my study more quickly.	1 2 3 4 5 6 7
4.	Using “mobile Facebook study group” increases my productivity in study.	1 2 3 4 5 6 7
5.	Learning how to use “mobile Facebook private study group” is easy for me.	1 2 3 4 5 6 7
6.	My interaction with “mobile Facebook private study group” is clear and understandable.	1 2 3 4 5 6 7
7.	I find “mobile Facebook private study group” is easy to use.	1 2 3 4 5 6 7
8.	It is easy for me to become skillful at using “mobile Facebook private study group”	1 2 3 4 5 6 7
9.	The interaction of class activities using smartphone with Internet access over “Facebook private study group” can stimulate learning.	1 2 3 4 5 6 7
10.	The class activities using smartphone with Internet access over “Facebook private study group” can increase my learning motivation.	1 2 3 4 5 6 7
11.	The class activities using smartphone with Internet access over “Facebook private study group” allow me to work with classmates in finding the answers to the discussion questions or case studies.	1 2 3 4 5 6 7
12.	The screen size of my smartphone is suitable for accessing “mobile Facebook private study group”.	1 2 3 4 5 6 7
13.	The touch screen of my smartphone is suitable for	1 2 3 4 5 6 7

Questions		7 = Strongly agree 1 = Strongly disagree
14.	accessing “mobile Facebook private study group”. The audio and video output of my smartphone is suitable for accessing “mobile Facebook private study group”.	1 2 3 4 5 6 7
15.	The speed of Internet access of my smartphone is suitable for accessing “mobile Facebook private study group”.	1 2 3 4 5 6 7
16.	The processing power my smartphone is suitable for accessing “mobile Facebook private study group”.	1 2 3 4 5 6 7
17.	Using “mobile Facebook private study group” is fun.	1 2 3 4 5 6 7
18.	Using “mobile Facebook private study group” is enjoyable.	1 2 3 4 5 6 7
19.	Using “mobile Facebook private study group” is very entertaining.	1 2 3 4 5 6 7
20.	There is a sense of human contact in “mobile Facebook private study group”	1 2 3 4 5 6 7
21.	There is a sense of personalness in “mobile Facebook private study group”	1 2 3 4 5 6 7
22.	There is a sense of sociability in “mobile Facebook private study group”	1 2 3 4 5 6 7
23.	There is a sense of human warmth in “mobile Facebook private study group”	1 2 3 4 5 6 7
24.	There is a sense of human sensitivity in “mobile Facebook private study group”	1 2 3 4 5 6 7
25.	The use of “mobile Facebook private study group” has become a habit for me.	1 2 3 4 5 6 7
26.	I am addicted to using “mobile Facebook private study group”.	1 2 3 4 5 6 7
27.	I must use “mobile Facebook private study group”.	1 2 3 4 5 6 7
28.	Using “mobile Facebook private study group” has become natural to me.	1 2 3 4 5 6 7
29.	I intend to continue using “mobile Facebook private study group” in the future.	1 2 3 4 5 6 7
30.	I will always try to use “mobile Facebook private study group” in my daily life.	1 2 3 4 5 6 7
31.	I plan to continue to use “mobile Facebook private study group” frequently.	1 2 3 4 5 6 7

Basic demographic and mobile usage information	
32. Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female Age:	

<p>33. Most commonly used mobile devices (multiple choices)</p> <p><input type="checkbox"/> Netbook</p> <p><input type="checkbox"/> Portable multimedia player</p> <p><input type="checkbox"/> iPod</p> <p><input type="checkbox"/> PDA</p> <p><input type="checkbox"/> Smartphone</p> <p><input type="checkbox"/> Electronic dictionary</p> <p><input type="checkbox"/> Others: _____</p> <p>34. Method of Internet access by smartphone (multiple choices)</p> <p><input type="checkbox"/> 3G</p> <p><input type="checkbox"/> 4G LTE</p> <p><input type="checkbox"/> Home WIFI</p> <p><input type="checkbox"/> Public WIFI in university, shopping mall, cafe, restaurant, airport</p> <p>35. Main method of mobile learning (multiple choices)</p> <p><input type="checkbox"/> Learning by downloading course contents</p> <p><input type="checkbox"/> Learning by interaction through Facebook private study group</p> <p><input type="checkbox"/> Learning by video case study using smartphone</p> <p><input type="checkbox"/> External contents searched from Internet using smartphone</p> <p><input type="checkbox"/> Internal contents in smartphone</p> <p><input type="checkbox"/> Others: _____</p> <p>36. Most commonly used mobile learning contents (multiple choices)</p> <p><input type="checkbox"/> Major courses in university</p> <p><input type="checkbox"/> Language study</p> <p><input type="checkbox"/> Lectures for exam getting certifications</p> <p><input type="checkbox"/> Lectures for getting a job</p> <p><input type="checkbox"/> Others: _____</p> <p>37. Major place of mobile learning (multiple choices)</p> <p><input type="checkbox"/> In the house</p> <p><input type="checkbox"/> In the university</p> <p><input type="checkbox"/> Traveling situation (in the subway or bus)</p> <p><input type="checkbox"/> On the streets</p> <p><input type="checkbox"/> Others: _____</p>	
<p>Frequency of usage of “mobile Facebook private study group”</p>	<p>7 = Always 1 = Never</p>
<p>38. How often do you access “mobile Facebook private study group” using mobile during a week?</p> <p>39. How often do you post on “mobile Facebook private study group” using mobile during a week?</p>	<p>1 2 3 4 5 6 7</p> <p>1 2 3 4 5 6 7</p>

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Appendix 2: Invitation letter for online survey (Quantitative research)



**London
South Bank
University**

UREC NO.

Invitation letter for online survey

Dear student,

You are invited to participate in the online survey and focus group interview on DBA research study. The DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU). The title of the research study is 'The student adoption of Facebook private group for mobile learning in Hong Kong'.

In Hong Kong, most universities provide Learning Management System (LMS), for example, MOODLE. In addition, in order to improve the interaction and communication in classroom, many teachers create Facebook private study groups for their courses so that students make use of their Smartphone to access Facebook study group for class activities. In order to improve student learning experience with the integration of these technologies, it is necessary to understand the factors influencing students' adoption of mobile learning (m-learning) via Facebook private study group. Therefore, it is important to collect student feedback towards m-learning using Facebook. There are two stages of data collection, i.e. 1st stage online survey and 2nd stage focus group interview.

You have been invited to participate because you are a student taught with integration of Facebook private study group using Smartphone and MOODLE. Your m-learning experience provides valuable information to this research study.

Your participation in the online survey and focus group interview is voluntary. You may refuse to take part in the research or exit the survey at any time. You are free to decline to answer any particular question you do not wish to answer for any reason.

Due to the teacher and researcher roles of Mr. Louis LAM, in order to remove the effects of teacher-student relationship on the survey results, the online survey will be conducted after the official announcement of the your final grade of the course. In other words, your final grade of the course will not be affected by whether you decide to participate in the survey or focus group interview. According to CUSCS school calendar, the official announcement of course results will be in mid July 2016. The online survey will be conducted by the end of July 2016.

In stage 1, the survey will be conducted online. An email will be sent to your school email address containing a unique Internet address at SurveyMonkey.com where you can access the online survey. Before, the survey starts, you are given the information sheet and consent form to decide if you are willing to participate in the online survey. In addition to stage 1, if you are interested in stage 2, you can fill in your name and contact email in the online survey consent form so that we can contact you about the exact date and time of stage 2 focus group interview which will be conducted in Bank of America Tower (BAT), Learning Centre of CUSCS at Central.

In terms of confidentiality, your survey answers will be sent to a link at SurveyMonkey.com where data will be stored in a password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. To comply with the Personal Data (Privacy) Ordinance (Cap. 486) in Hong Kong and Data Protection Act 1998 in United Kingdom, any information collected will be encrypted with password and stored in a password-protected computer. Only the researcher and supervisor will have direct access to the information. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

In terms of benefits, it is unlikely that you will gain any personal benefit from participating in this research. However, the information you share with the researcher can help the management of university and educators more information for successful integration of m-learning into pedagogical strategies. In terms of risks, it is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the survey questions, you are free to withdraw from the survey anytime.

Yours sincerely,
Regards

Mr. Louis LAM, LSBU DBA student.

Appendix 3: Information sheet for online survey (Quantitative research)



**London
South Bank
University**

UREC No.

Doctor in Business Administration (DBA) Research Study Information Sheet for online survey participants

You are invited to participate in an online survey on DBA research study. This DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU). Before you decide if you want to take part, please take time to read this information sheet carefully.

What is the DBA research study title?

Student adoption of Facebook private group for mobile learning in Hong Kong

What is the research study's purpose?

In Hong Kong, most universities provide Learning Management System (LMS), for example, MOODLE. In addition, in order to improve the interaction and communication in classroom, many teachers create Facebook private study groups for their courses so that students make use of their Smartphone to access Facebook study group for class activities. In order to improve student learning experience with the integration of these technologies, it is necessary to understand the factors influencing students' adoption of mobile learning (m-learning) via Facebook private study group. Therefore, it is important to collect student feedback towards m-learning using Facebook.

Why have I been chosen?

You have been invited to participate because you are a student taught with integration of Facebook private study group using Smartphone and MOODLE. Your m-learning experience provides important information to this research study.

What will it involve?

There are two stages of data collection in this research study, i.e. (1) online survey and (2) focus group interview. If you agree to participate in first stage of research study, you will be invited to fill in an online survey containing **39** questions divided into two main sessions, (1) Basic demographic and mobile usage information, and (2) perception towards some important aspects of mobile learning. If you are interested in taking part in focus group interview in person, you can provide contact information in the online survey consent form.

How will the research be used?

The findings of the research will be used only in this DBA research study conducted by Mr. Louis LAM. No identifying information published and presented in the research paper. The online survey is conducted through SurveyMonkey.com where data will be stored in a password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

What are the risks of participating in the online survey?

UREC NO.

It is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the survey questions, you are free to withdraw from the survey anytime.

What are the benefits of participating in the online survey?

It is unlikely that you will gain any personal benefit from participating in this research. However, the information you share with the researcher can help the management of university and educators more information for successful integration of m-learning into pedagogical strategies.

How do I give/withdraw consent?

This research will help educators and school develop pedagogical strategies in m-learning to improve student learning experience. Your experience in m-learning will make a valuable contribution to this and we would be very grateful if you would agree to take part. You can do this by signing the attached consent form. However, we would understand if you would prefer not to take part.

When do I do the online survey?

Due to the teacher and researcher roles of Mr. Louis LAM, **in order to remove the effects of teacher-student relationship on the survey results, the online survey will be conducted after the official announcement of the your final grade of the course.** In other words, your final grade of the course will not be affected by whether you decide to participate in the survey or not.

How do I do the online survey?

In order to ensure anonymity, an online survey invitation email is sent to you through course group email address. The email contains a unique Internet address at SurveyMonkey.com where you can access the online survey. Before you start the online survey, you are required to read this information sheet and sign the online consent form by checking the box 'I understand the contents, terms, benefits and risks of the research study as stated in the information sheet' and click the button 'I agree' meaning that the online survey is voluntary and you are willing to participate to give valuable feedback about m-learning through Facebook private study group. Your survey answers will be sent to a link at SurveyMonkey.com where data will be stored in a password protected electronic format

If I have further questions or wish to discuss any aspect of the research, what should I do?

This study is being completed as part of a Doctor in Business Administration at London South Bank University. It has been reviewed and ethically approved by the London Southbank University Research Ethics Committee. If you have a concern about any aspect of this study, you should ask to speak with the researcher who will do their best to answer your questions (Mr. Louis LAM, Tel: 852-3943-9132, email: laml@lsbu.ac.uk). If you wish any further information regarding this study or have any complaints about the way you have been dealt with during the study or other concerns you can contact: Dr. Jon Warwick, Tel: +44 (0)20 7815 7436, Email: warwick@lsbu.ac.uk, who is the Academic Supervisor for this study. Finally, if you remain unhappy and wish to complain formally, you can contact the Chair of the University Research Ethics Committee(ethics@lsbu.ac.uk). Details can be obtained from the university website: <https://my.lsbu.ac.uk/page/research-degrees-ethics>.

Appendix 4: Consent form for online survey (Quantitative research)



UREC No.

Doctor in Business Administration (DBA) Research Study Electronic Consent Form for online survey

You are invited to participate in an online survey on DBA research study. This DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU).

TITLE OF STUDY

The student adoption of Facebook private group for mobile learning in Hong Kong

PARTICIPATION

Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time. You are free to decline to answer any particular question you do not wish to answer for any reason.

BENEFITS

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about mobile learning through Facebook private study group and give the management of university and educators more information about successful integration of m-learning using Facebook private study group.

RISKS

It is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the survey questions, you are free to withdraw from the survey anytime.

CONFIDENTIALITY

Your survey answers will be sent to a link at SurveyMonkey.com where data will be stored in a password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. To comply with the Personal Data (Privacy) Ordinance (Cap. 486) in Hong Kong and Data Protection Act 1998 in United Kingdom, any information collected will be encrypted with password and stored in a password-protected computer. Only the researcher and supervisor will have direct access to the information. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

ADDITIONAL INTERVIEW (OPTIONAL)

At the end of the survey you will be asked if you are interested in participating in an additional focus group interview in person. If you are interested, you will provide contact information. If you choose to provide contact information such as email address, your survey responses may no longer be anonymous to the researcher. However, no names or identifying information would be included in any publications or presentations based on these data, and your responses to this survey will remain confidential.

CONTACT

If you have a concern about any aspect of this study, you should ask to speak with the researcher who will do their best to answer your questions (Mr. Louis LAM, Tel: 852-3943-9132, email: lam@lsbu.ac.uk). If you wish any further information regarding this study or have any complaints about the way you have been dealt with during the study or other concerns you can contact: Dr. Jon

UREC No.

Warwick, Tel: +44 (0)20 7815 7436, Email: warwick@lsbu.ac.uk, who is the Academic Supervisor for this study. Finally, if you remain unhappy and wish to complain formally, you can contact the Chair of the University Research Ethics Committee (ethics@lsbu.ac.uk). Details can be obtained from the university website: <https://my.lsbu.ac.uk/page/research-degrees-ethics>.

ONLINE SURVEY**PLEASE TICK TO CONSENT.**

- I have read the attached information sheet on the research in which I have been asked and agree to participate and have been given an electronic copy to keep. I have had the opportunity to discuss the details and ask questions about this information. ☐
- The information sheet has explained the nature and purpose of the research and I believe that I understand what is being proposed. ☐
- I understand that my responses are remained anonymous. No one will be able to identify me or me answers. ☐
- I understand that my personal involvement and my particular data from this study will remain strictly confidential. Only researchers involved in the study will have access. ☐
- I have been informed about what the data collected will be used for, to whom it may be disclosed, and how long it will be retained. ☐
- I have received satisfactory answers to all of my questions, if any. ☐
- I hereby fully and freely consent to participate in the study which has been fully explained to me. ☐
- I understand that I am free to withdraw from the study at any time, without giving a reason. ☐

ADDITIONAL INTERVIEW (OPTIONAL)**PLEASE TICK TO CONSENT.**

- I am interested in participating in an additional focus group interview in person. I will provide contact information such as name and email address. I understand that my survey responses may no longer be anonymous to the researcher. However, I understand that no names or identifying information would be included in any publications or presentations based on these data, and my responses to this survey will remain confidential. ☐

Participant's name

Participant's email address

Please print a copy of this consent form for your records, if you so desire.

PLEASE TICK TO CONSENT.

- I have read and understand the above consent form, I certify that I am 18 years old or older and, by clicking the 'I agree' button to enter the survey, I indicate my willingness voluntarily take part in the online survey of the study. ☐

I agree

I disagree

Appendix 5: Invitation letter for focus group interview (Qualitative analysis)



**London
South Bank
University**

UREC NO.

Invitation letter for focus group interview

Dear student,

You are invited to participate in focus group interview on DBA research study. The DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU). The title of the research study is 'The student adoption of Facebook private group for mobile learning in Hong Kong'.

In Hong Kong, most universities provide Learning Management System (LMS), for example, MOODLE. In addition, in order to improve the interaction and communication in classroom, many teachers create Facebook private study groups for their courses so that students make use of their Smartphone to access Facebook study group for class activities. In order to improve student learning experience with the integration of these technologies, it is necessary to understand the factors influencing students' adoption of mobile learning (m-learning) via Facebook private study group. Therefore, it is important to collect student feedback towards m-learning using Facebook. There are two stages of data collection, i.e. 1st stage online survey and 2nd stage focus group interview.

You have been invited to participate in focus group interview because you are a student taught with integration of Facebook private study group using Smartphone and MOODLE. Your m-learning experience provides valuable information to this research study.

Your participation in focus group interview is voluntary. You may refuse to take part in the research or exit the survey at any time. You are free to decline to answer any particular question you do not wish to answer for any reason.

Due to the teacher and researcher roles of Mr. Louis LAM, in order to remove the effects of teacher-student relationship on the survey results, the focus group interview conducted after the official announcement of the your final grade of the course. In other words, your final grade of the course will not be affected by whether you decide to participate in the survey or focus group interview.

The focus group interview will be conducted in Bank of America Tower (BAT), Learning Centre of CUSCS at Central in mid August 2016. The exact date of interview will be notified you by email. There will be 6 – 8 students joining the interview expressing their views about m-learning. The interview will last for about 30 - 45 minutes. It will be audio recorded and will be transcribed in electronic format. All the identities are coded. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. To comply with the Personal Data (Privacy) Ordinance (Cap. 486) in Hong Kong and Data Protection Act 1998 in United Kingdom, any information collected will be encrypted with password and stored in a password-protected computer. Only the researcher and supervisor will have direct access to the information. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

In terms of benefits, it is unlikely that you will gain any personal benefit from participating in this research. However, the information you share with the researcher can help the management of university and educators more information for successful integration of m-learning into pedagogical strategies. In terms of risks, it is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the survey questions, you are free to withdraw from the survey anytime.

Yours sincerely,
Regards

Mr. Louis LAM
LSBU DBA student

Appendix 6: Information sheet for focus group interview (Qualitative analysis)



UREC No.

Doctor in Business Administration (DBA) Research Study Information Sheet for focus group interview participants

You are invited to participate in focus group interview on DBA research study. This DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU). Before you decide if you want to take part, please take time to read this information sheet carefully.

What is the DBA research study title?

Student adoption of Facebook private group for mobile learning in Hong Kong

What is the research study's purpose?

In Hong Kong, most universities provide Learning Management System (LMS), for example, MOODLE. In addition, in order to improve the interaction and communication in classroom, many teachers create Facebook private study groups for their courses so that students make use of their Smartphone to access Facebook study group for class activities. In order to improve student learning experience with the integration of these technologies, it is necessary to understand the factors influencing students' adoption of mobile learning (m-learning) via Facebook private study group. Therefore, it is important to collect student feedback towards m-learning using Facebook.

Why have I been chosen?

You have been invited to participate because you are a student taught with integration of Facebook private study group using Smartphone and MOODLE. Your m-learning experience provides important information to this research study.

What will it involve?

There are two stages of data collection in this research study, i.e. (1) online survey and (2) focus group interview. If you agree to participate in first stage of research study, you will be invited to fill in an online survey containing **39** questions divided into two main sessions, (1) Basic demographic and mobile usage information, and (2) perception towards some important aspects of mobile learning. If you are interested in taking part in focus group interview in person, you can provide contact information in the online survey consent form.

How will the research be used?

The findings of the research will be used only in this DBA research study conducted by Mr. Louis LAM. No identifying information published and presented in the research paper. The focus group interview is conducted at Bank of America Tower (BAT), Learning Centre of CUSCS in Central. The interview will be audio recorded and transcribed in password protected electronic format for further data analysis. To comply with the Personal Data (Privacy) Ordinance (Cap. 486) in Hong Kong and Data Protection Act 1998 in United Kingdom, any information collected will be encrypted with password and stored in a password-protected computer. Only the researcher and supervisor will have direct access to the information. Any reference to you will be coded. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

UREC NO.

What are the risks of participating in focus group interview?

It is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the survey questions, you are free to withdraw from the survey anytime.

What are the benefits of participating in focus group interview?

It is unlikely that you will gain any personal benefit from participating in this research. However, the information you share with the researcher can help the management of university and educators more information for successful integration of m-learning into pedagogical strategies.

How do I give/withdraw consent?

This research will help educators and school develop pedagogical strategies in m-learning to improve student learning experience. Your experience in m-learning will make a valuable contribution to this and we would be very grateful if you would agree to take part. You can do this by signing the attached consent form. However, we would understand if you would prefer not to take part.

When will be focus group interview?

Due to the teacher and researcher roles of Mr. Louis LAM, **in order to remove the effects of teacher-student relationship on the survey results, the online survey will be conducted after the official announcement of the your final grade of the course.** In other words, your final grade of the course will not be affected by whether you decide to participate in the survey or not.

What do I do in focus group interview?

Before you start the focus group interview, you are required to read this information sheet and sign the focus group interview consent form. When the focus group interview starts, the researcher will raise a number of pre-designed questions for participants to discuss and express their opinions. The interview will be audio recorded and transcribed in password-protected electronic format storing in password-protected computer. Only the researcher and supervisor will have direct access to the information.

If I have further questions or wish to discuss any aspect of the research, what should I do?

This study is being completed as part of a Doctor in Business Administration at London South Bank University. It has been reviewed and ethically approved by the London Southbank University Research Ethics Committee. If you have a concern about any aspect of this study, you should ask to speak with the researcher who will do their best to answer your questions (Mr. Louis LAM, Tel: 852-3943-9132, email: laml@lsbu.ac.uk). If you wish any further information regarding this study or have any complaints about the way you have been dealt with during the study or other concerns you can contact: Dr. Jon Warwick, Tel: +44 (0)20 7815 7436, Email: warwick@lsbu.ac.uk, who is the Academic Supervisor for this study. Finally, if you remain unhappy and wish to complain formally, you can contact the Chair of the University Research Ethics Committee(ethics@lsbu.ac.uk). Details can be obtained from the university website: <https://my.lsbu.ac.uk/page/research-degrees-ethics>.

Appendix 7: Consent form for focus group interview (Qualitative analysis)



UREC No.

Doctor in Business Administration (DBA) Research Study Consent Form for focus group interview

You are invited to participate in focus group interview on DBA research study. This DBA research study is conducted by Mr. Louis LAM, a student at London South Bank University (LSBU). Before you decide if you want to take part, please take time to read this information sheet carefully.

TITLE OF STUDY

The student adoption of Facebook private group for mobile learning in Hong Kong

PARTICIPATION

Your participation in this focus group interview is voluntary. You may refuse to take part in the research or exit the survey at any time. You are free to decline to answer any particular question you do not wish to answer for any reason.

BENEFITS

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about mobile learning through Facebook private study group and give the management of university and educators more information about successful integration of m-learning using Facebook private study group.

RISKS

It is not anticipated that you will be any disadvantage or suffer any risk from this study. If there is a chance of emotional upset due to the wordings of the interview questions, you are free to withdraw from the survey anytime.

CONFIDENTIALITY

To ensure anonymity, all the interview information, including the names of individuals, locations and other identifiable information will be changed to protect student identity. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. The interview will be audio recorded and transcribed in password protected electronic format for further data analysis. To comply with the Personal Data (Privacy) Ordinance (Cap. 486) in Hong Kong and Data Protection Act 1998 in United Kingdom, any information collected will be encrypted with password and stored in a password-protected computer. Only the researcher and supervisor will have direct access to the information. Any reference to you will be coded. This information will be held for 5 years after the completion of this study until 31st Dec 2022. Then, all the data will be destroyed.

CONTACT

If you have a concern about any aspect of this study, you should ask to speak with the researcher who will do their best to answer your questions (Mr. Louis LAM, Tel: 852-3943-9132, email: laml@lsbu.ac.uk). If you wish any further information regarding this study or have any complaints about the way you have been dealt with during the study or other concerns you can contact: Dr. Jon Warwick, Tel: +44 (0)20 7815 7436, Email: warwick@lsbu.ac.uk, who is the Academic Supervisor for this study. Finally, if you remain unhappy and wish to complain formally, you can contact the Chair of the University Research Ethics Committee (ethics@lsbu.ac.uk). Details can be obtained from the university website: <https://my.lsbu.ac.uk/page/research-degrees-ethics>.

UREC No. _____

FOCUS GROUP INTERVIEW**PLEASE TICK TO CONSENT.**

- I have read the attached information sheet on the research in which I have been asked and agree to participate and have been given an electronic copy to keep. I have had the opportunity to discuss the details and ask questions about this information. ☐
- The information sheet has explained the nature and purpose of the research and I believe that I understand what is being proposed. ☐
- I understand that my responses are remained anonymous. No one will be able to identify me or me answers. ☐
- I understand that my personal involvement and my particular data from this study will remain strictly confidential. Only researchers involved in the study will have access. ☐
- I have been informed about what the data collected will be used for, to whom it may be disclosed, and how long it will be retained. ☐
- I have received satisfactory answers to all of my questions, if any. ☐
- I hereby fully and freely consent to participate in the study which has been fully explained to me. ☐
- I understand that I am free to withdraw from the study at any time, without giving a reason. ☐
- I consent to have the have the interview audio recorded using a digital recorder and transcribed. ☐
- I consent to having anonymised direct quotations from the interviews used in publications. ☐

Please print a copy of this consent form for your records, if you so desire.

- I have read and understand the above consent form, I certify that I am 18 years old or older and, by ticking the 'I agree' box, I indicate my willingness voluntarily take part in the interview of the study.

☐ **I agree**
☐ **I disagree**

Participant's Name: (Block Capitals) _____

Participant's Name: Signature _____

Participant's Witness' Name: _____

Witness' Signature: _____

As the Researcher responsible for this study I, [Mr. LAM Lui, Louis](#), confirm that I have explained to the participant named above the nature and purpose of the research to be undertaken.

Researcher's Name: _____

Researcher's Signature: _____

Appendix 8: Focus group interview guiding questions (Qualitative research)

1. Open-ended questions adopted from literature in m-learning

Gikas & Grant (2013)

Part 1:

- What are the changes to the learning environment when mobile computing devices are integrated?

Part 2:

- Can you describe the course where you used mobile computing devices?
- Tell me how that is different from a course not using mobile computing devices?
- Tell me what your role was in interacting with the mobile technology?
- Tell me about your teacher's expectation of your interaction with the mobile computing device?
- What did they expect from you?
- How did that impact your understanding of the content?

Part 3:

- What did you use the device for in the course?
- How did you interact with classmates/teachers using the device?
- What type of activities did you use the device for in your course?

Part 4:

- What changes to do you see in the learners when you used the mobile computing devices?
- Tell me about the experience of using mobile computing devices in the learning environment.
- Tell me how that's different from a course not using mobile computing devices.

Part 5:

- What change did you see in the learner's behavior? What types of change did you see in the student interaction with the content?
- Tell me about the student interaction with the devices — what course related activities did they use it for?

Part 6:

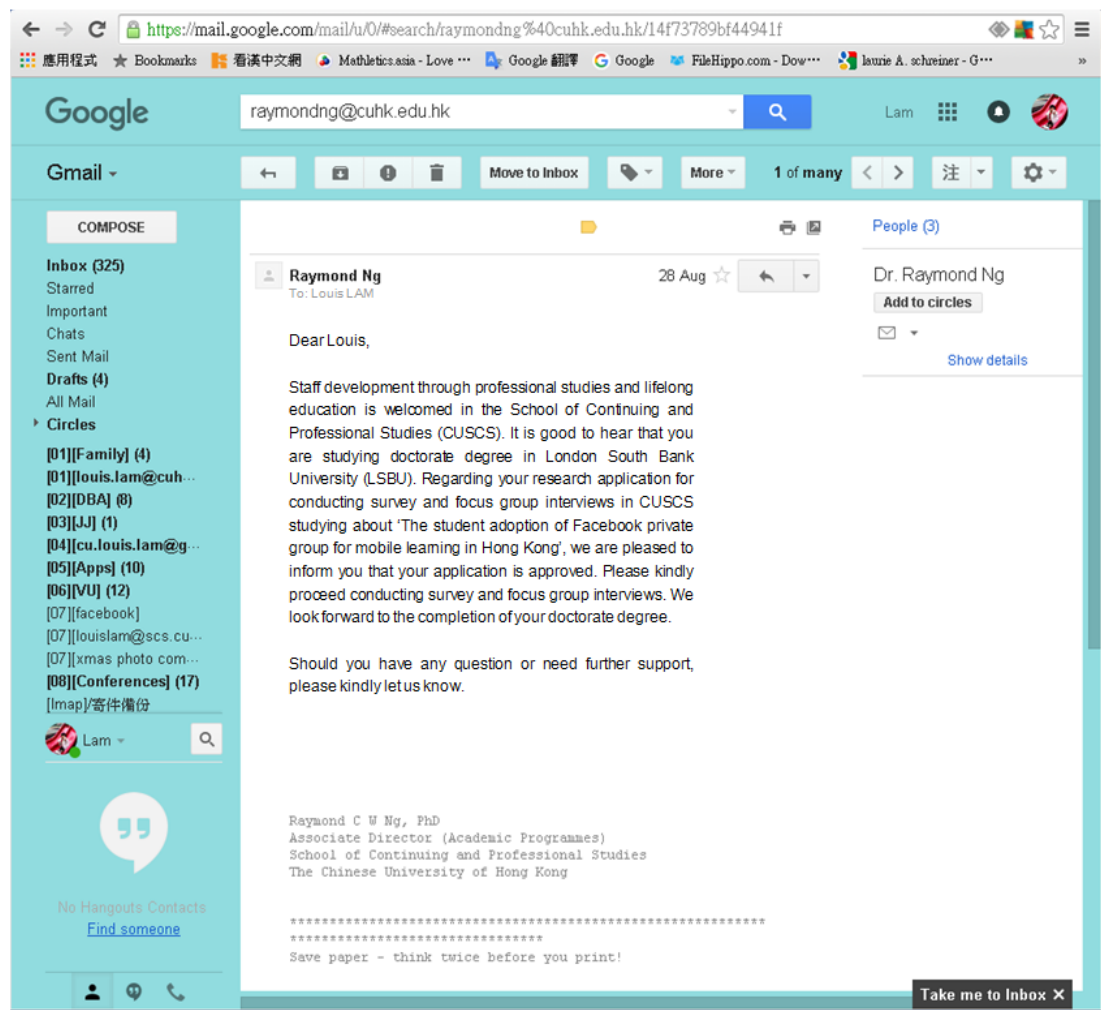
- How were the devices used for communication?

2. Other open-ended questions

Exploratory questions

- Why you like/dislike m-learning?
- Why you like/dislike m-learning using Facebook private study group?
- What affects you accept Facebook private study group for m-learning?
- Do you think using Moodle and Facebook private group for m-learning are better than Moodle alone? Why/why not?
- Do you think m-learning is ease to use? Why/why not?
- Do you think m-learning using Facebook private study group is fun? Why/why not?
- Do you think m-learning can improve the effectiveness of learning? Why/why not?
- Do you think m-learning can courage you to learn? Why/why not?
- Do you think peer effects from Facebook private study group encourage you to learn? Why/why not?
- Do you think peer interaction & communication over Facebook private study group encourage you to learn? Why/why not?
- Do you prefer using m-learning in supporting classroom teaching learning? Why/why not?

Appendix 9: Approval letter for survey and focus groups



Appendix 10: Approval letter from LSBU Research Ethics Committee

**London South Bank
University**

Direct line: 020-7815 6025
E-mail: mitchen5@lsbu.ac.uk
Ref: UREC 1601

Lui Lam
Flat A 2/F Blk 10
Provident Centre
39 Wharf Road
North Point
Hong Kong

Wednesday 29 June 2016

Dear Lui

RE: Student adoption of Facebook private group for mobile learning in Hong Kong

Thank you for submitting this proposal and for your response to the reviewers' comments.

I am pleased to inform you that full Chair's Approval has been given by Vice Chair, Katya Mileva, on behalf of the University Research Ethics Committee.

I wish you every success with your research.

Yours sincerely,



Nicola Mitchell

Secretary, LSBU Research Ethics Committee

cc:

Prof Shushma Patel, Chair, LSBU Research Ethics Committee

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Appendix 11: SPSS outputs of Factor Analysis

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
PE1A	4.56	1.579	123
PE2A	4.67	1.662	123
PE3A	4.61	1.602	123
PE4A	4.68	1.681	123
DU1A	4.73	1.584	123
DU2A	4.72	1.545	123
DU3A	4.74	1.572	123
DU4A	4.80	1.594	123
EE1A	4.85	1.610	123
EE2A	4.80	1.545	123
EE3A	4.98	1.565	123
EE4A	4.89	1.498	123
HM1A	4.67	1.662	123
HM2A	4.42	1.482	123
HM3A	4.75	1.617	123
SP1A	4.76	1.610	123
SP2A	4.95	1.487	123
SP3A	4.72	1.559	123
SP4A	5.02	1.355	123
SP5A	4.72	1.550	123
HT1A	4.61	1.508	123
HT2A	4.63	1.570	123
HT3A	4.59	1.541	123
HT4A	4.76	1.510	123
HT5A	4.66	1.459	123
IL1A	4.29	1.514	123
IL2A	4.27	1.569	123
IL3A	4.35	1.547	123
BI1A	4.52	1.554	123
BI2A	4.64	1.415	123
BI3A	4.85	1.608	123

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.748
Bartlett's Test of Sphericity	Approx. Chi-Square	2532.355
	df	465
	Sig.	.000

Communalities		
	Initial	Extraction
PE1A	1.000	.823
PE2A	1.000	.857
PE3A	1.000	.847
PE4A	1.000	.835
DU1A	1.000	.632
DU2A	1.000	.834
DU3A	1.000	.846
DU4A	1.000	.837
EE1A	1.000	.662
EE2A	1.000	.711
EE3A	1.000	.688
EE4A	1.000	.686
HM1A	1.000	.728
HM2A	1.000	.535
HM3A	1.000	.585
SP1A	1.000	.717
SP2A	1.000	.773
SP3A	1.000	.552
SP4A	1.000	.679
SP5A	1.000	.579
HT1A	1.000	.720
HT2A	1.000	.668
HT3A	1.000	.707
HT4A	1.000	.650
HT5A	1.000	.668
IL1A	1.000	.967
IL2A	1.000	.883
IL3A	1.000	.880
BI1A	1.000	.698
BI2A	1.000	.542
BI3A	1.000	.479

Extraction Method: Principal Component Analysis.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.554	24.368	24.368	7.554	24.368	24.368	3.768	12.155	12.155
2	3.771	12.164	36.532	3.771	12.164	36.532	3.608	11.640	23.795
3	2.707	8.734	45.265	2.707	8.734	45.265	3.403	10.977	34.772
4	2.551	8.230	53.495	2.551	8.230	53.495	2.842	9.168	43.940
5	1.877	6.055	59.550	1.877	6.055	59.550	2.652	8.555	52.495
6	1.603	5.172	64.722	1.603	5.172	64.722	2.408	7.769	60.264
7	1.138	3.669	68.391	1.138	3.669	68.391	1.859	5.996	66.260
8	1.065	3.437	71.828	1.065	3.437	71.828	1.726	5.567	71.828
9	.864	2.788	74.616						
10	.848	2.734	77.350						
11	.763	2.463	79.813						
12	.680	2.194	82.007						
13	.647	2.086	84.093						
14	.623	2.009	86.102						
15	.542	1.747	87.849						
16	.508	1.640	89.489						
17	.406	1.310	90.799						
18	.383	1.235	92.034						
19	.358	1.155	93.189						
20	.309	.997	94.186						
21	.291	.939	95.125						
22	.254	.818	95.943						
23	.251	.809	96.753						
24	.208	.671	97.424						
25	.195	.629	98.052						
26	.178	.574	98.627						
27	.170	.549	99.176						
28	.118	.381	99.558						
29	.064	.206	99.764						
30	.039	.127	99.891						
31	.034	.109	100.000						

Component Matrix^a

	Component							
	1	2	3	4	5	6	7	8
HT3A	.709							
HT5A	.699							
SP4A	.690							
HT2A	.638							
SP2A	.614							
HT1A	.593							
HT4A	.591							
SP5A	.589							
EE4A	.584							
EE3A	.565							
HM3A								
EE1A								
EE2A								
BI3A								
PE4A		.728						
PE3A		.725						
PE2A		.719						
PE1A		.675						
IL1A			.897					
IL2A			.850					
IL3A			.823					
DU2A	.540			.668				
DU4A	.541			.652				
DU3A	.551			.647				
DU1A				.560				
SP1A								
SP3A								
HM2A								
BI2A								
HM1A							.553	
BI1A								.588

Extraction Method: Principal Component Analysis.^a

a. 8 components extracted.

Rotated Component Matrix^a

	1	2	3	4	5	6	7	8
PE2A	.918							
PE4A	.894							
PE1A	.890							
PE3A	.860							
HT1A		.811						
HT2A		.767						
HT3A		.748						
HT4A		.719						
HT5A		.661						
DU4A			.890					
DU3A			.885					
DU2A			.885					
DU1A			.763					
IL1A				.980				
IL2A				.936				
IL3A				.931				
SP1A					.769			
SP2A					.767			
SP3A					.701			
SP4A					.609			
SP5A					.510			
EE2A						.770		
EE1A						.744		
EE3A						.698		
EE4A						.576		
HM1A							.803	
HM2A							.658	
HM3A							.562	
BI1A								.741
BI2A								.614
BI3A								.555

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.^a

a. Rotation converged in 7 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6
1	.350	.558	.406	-.071	.374	.354
2	.785	-.193	-.305	.357	-.275	.214
3	-.279	.139	.104	.919	.097	-.131
4	.250	-.227	.813	.031	-.275	-.331
5	.105	-.583	.017	-.048	.546	-.242
6	-.054	-.246	.154	.136	.408	.524
7	-.318	-.233	.208	-.025	-.477	.539
8	-.071	-.355	.055	.034	.085	.281

Component Transformation Matrix

Component	7	8
1	.253	.258
2	.059	-.022
3	.110	.098
4	-.171	-.099
5	.529	.099
6	-.323	-.591
7	.530	.033
8	-.474	.744

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Appendix 12: SPSS outputs of Multiple linear regression

Descriptive Statistics

	Mean	Std. Deviation	N
BI	4.6454	1.71810	123
PE	5.0488	1.54895	123
HT	4.7350	1.80045	123
DU	4.5122	1.79305	123
EE	4.9268	1.88901	123
SP	5.2309	1.77266	123
IL	4.4067	1.93702	123
HM	4.7105	1.72351	123

Correlations

		BI	PE	HT	DU	EE	SP	IL	HM
Pearson Correlation	BI	1.000	.256	.645	.467	.539	.580	.561	.664
	PE	.256	1.000	-.016	.251	-.030	.012	.116	.203
	HT	.645	-.016	1.000	.286	.496	.545	.411	.559
	DU	.467	.251	.286	1.000	.175	.251	.238	.312
	EE	.539	-.030	.496	.175	1.000	.322	.429	.384
	SP	.580	.012	.545	.251	.322	1.000	.278	.501
	IL	.561	.116	.411	.238	.429	.278	1.000	.407
	HM	.664	.203	.559	.312	.384	.501	.407	1.000
Sig. (1-tailed)	BI	.	.002	.000	.000	.000	.000	.000	.000
	PE	.002	.	.428	.003	.373	.446	.100	.012
	HT	.000	.428	.	.001	.000	.000	.000	.000
	DU	.000	.003	.001	.	.026	.003	.004	.000
	EE	.000	.373	.000	.026	.	.000	.000	.000
	SP	.000	.446	.000	.003	.000	.	.001	.000
	IL	.000	.100	.000	.004	.000	.001	.	.000
	HM	.000	.012	.000	.000	.000	.000	.000	.
N	BI	123	123	123	123	123	123	123	123
	PE	123	123	123	123	123	123	123	123
	HT	123	123	123	123	123	123	123	123
	DU	123	123	123	123	123	123	123	123
	EE	123	123	123	123	123	123	123	123
	SP	123	123	123	123	123	123	123	123
	IL	123	123	123	123	123	123	123	123
	HM	123	123	123	123	123	123	123	123

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	HM, PE, DU, EE, IL, SP, HT ^b	.	Enter

a. Dependent Variable: BI

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics
					R Square Change
1	.847 ^a	.718	.701	.93951	.718

Model Summary^b

Model	Change Statistics				Durbin-Watson
	F Change	df1	df2	Sig. F Change	
1	41.856 ^a	7	115	.000	1.988

a. Predictors: (Constant), HM, PE, DU, EE, IL, SP, HT

b. Dependent Variable: BI

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	258.618	7	36.945	41.856	.000 ^b
	Residual	101.508	115	.883		
	Total	360.127	122			

a. Dependent Variable: BI

b. Predictors: (Constant), HM, PE, DU, EE, IL, SP, HT

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.488	.422		-3.526	.001
	PE	.167	.059	.151	2.847	.005
	HT	.181	.067	.190	2.726	.007
	DU	.168	.052	.175	3.217	.002
	EE	.166	.055	.183	3.046	.003
	SP	.201	.060	.208	3.359	.001
	IL	.177	.052	.199	3.414	.001
	HM	.217	.066	.218	3.284	.001

Coefficients^a

Model		95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-2.323	-.652					
	PE	.051	.284	.256	.257	.141	.871	1.148
	HT	.050	.313	.645	.246	.135	.504	1.983
	DU	.064	.271	.467	.287	.159	.827	1.209
	EE	.058	.274	.539	.273	.151	.682	1.467
	SP	.083	.320	.580	.299	.166	.641	1.561
	IL	.074	.279	.561	.303	.169	.721	1.387
	HM	.086	.348	.664	.293	.163	.558	1.792

a. Dependent Variable: BI

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.7968	7.3718	4.6454	1.45596	123
Residual	-4.55090	2.34041	.00000	.91216	123
Std. Predicted Value	-2.643	1.873	.000	1.000	123
Std. Residual	-4.844	2.491	.000	.971	123

a. Dependent Variable: BI

Appendix 13: SPSS outputs of Mann-Whitney Test

Gender 0 = Male

Gender 1 = Female

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
PE	123	4.6321	1.49806	1.00	7.00	3.0000	5.0000	6.0000
DU	123	4.7459	1.39781	1.00	7.00	3.7500	5.0000	6.0000
EE	123	4.8801	1.21986	1.00	7.00	4.0000	5.0000	6.0000
HM	123	4.6151	1.18359	1.00	7.00	4.0000	4.6667	5.3333
SP	123	4.8340	1.1336	1.00	7.00	4.4000	5.0000	5.6000
HT	123	4.6500	1.2250	1.00	7.00	4.0000	5.0000	5.4000
IL	123	4.3035	1.4741	1.00	7.00	3.0000	4.3333	5.0000
Gender	123	.31	.464	0	1	.00	.00	1.00

Ranks

	Gender	N	Mean Rank	Sum of Ranks
PE	0	85	64.46	5479.00
	1	38	56.50	2147.00
	Total	123		
DU	0	85	58.51	4973.00
	1	38	69.82	2653.00
	Total	123		
EE	0	85	68.01	5781.00
	1	38	48.55	1845.00
	Total	123		
HM	0	85	60.82	5169.50
	1	38	64.64	2456.50
	Total	123		
SP	0	85	58.78	4996.50
	1	38	69.20	2629.50
	Total	123		
HT	0	85	60.89	5175.50
	1	38	64.49	2450.50
	Total	123		
IL	0	85	60.06	5105.50
	1	38	66.33	2520.50
	Total	123		

Test Statistics^a

	PE	DU	EE	HM	SP	HT	IL
Mann-Whitney U	1406.000	1318.000	1104.000	1514.500	1341.500	1520.500	1450.500
Wilcoxon W	2147.000	4973.000	1845.000	5169.500	4996.500	5175.500	5105.500
Z	-1.153	-1.637	-2.806	-.554	-1.502	-.519	-.916
Asymp. Sig. (2-tailed)	.249	.102	.005	.580	.133	.604	.360

a. Grouping Variable: Gender

Appendix 14: SPSS outputs of Kruskal-Wallis Test

AgeGP 0: 18-21

AgeGP 1: 22-24

AgeGP 2: 25-29

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
PE	123	4.6321	1.49806	1.00	7.00	3.0000	5.0000	6.0000
DU	123	4.7459	1.39781	1.00	7.00	3.7500	5.0000	6.0000
EE	123	4.8801	1.21986	1.00	7.00	4.0000	5.0000	6.0000
HM	123	4.6151	1.18354	1.00	7.00	4.0000	4.6667	5.3333
SP	123	4.834	1.13360	1.00	7.00	4.4000	5.0000	5.6000
HT	123	4.650	1.22500	1.00	7.00	4.0000	5.0000	5.4000
IL	123	4.3035	1.47413	1.00	7.00	3.0000	4.3333	5.0000
AgeGP	123	.32	.605	0	2	.00	.00	.00

Ranks

	AgeGP	N	Mean Rank
PE	0	93	66.71
	1	21	38.05
	2	9	69.22
	Total	123	
DU	0	93	56.60
	1	21	74.29
	2	9	89.17
	Total	123	
EE	0	93	63.17
	1	21	59.05
	2	9	56.78
	Total	123	
HM	0	93	58.26
	1	21	66.52
	2	9	90.06
	Total	123	
SP	0	93	56.92
	1	21	74.74
	2	9	84.78
	Total	123	
HT	0	93	62.42
	1	21	64.21
	2	9	52.44
	Total	123	
IL	0	93	63.68
	1	21	69.14
	2	9	28.00
	Total	123	

Test Statistics^{a,b}

	PE	DU	EE	HM	SP	HT	IL
Chi-Square	11.651	9.992	.441	7.023	8.301	.746	9.550
df	2	2	2	2	2	2	2
Asymp. Sig.	.003	.007	.802	.030	.016	.689	.008

a. Kruskal Wallis Test

b. Grouping Variable: AgeGP